

**WIDE-AREA AUGMENTATION SYSTEM  
PERFORMANCE ANALYSIS REPORT**

**Report #45**

**Reporting Period: April 1 to June 30, 2013**

**July 2013**

**FAA/William J. Hughes Technical Center  
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**Executive Summary**

Since 1999 the WAAS Test Team at the William J. Hughes Technical Center has reported GPS performance as measured against the GPS Standard Positioning Service (SPS) Signal Specification. These quarterly reports are known as the PAN (Performance Analysis Network) Report. In addition to that report, the WAAS Test Team reports on the performance of the Wide-Area Augmentation System (WAAS). This report, #45, covers WAAS performance during the period from April 1, 2013 to June 30, 2013.

The following table shows observations for accuracy and availability made during the reporting period for CONUS and Alaska sites. The international sites are excluded from this table, but are included in the body of the report. See the body of the report for additional results in accuracy, availability, safety index, range accuracy, WAAS broadcast message rates, and GEO ranging availability. LP service is available when the calculated Horizontal Protection Level (HPL) is less than 40 meters. LPV service is available when the calculated HPL is less than 40 meters and the Vertical Protection Level (VPL) is less than 50 meters. LPV 200 service is available when the calculated HPL is less than 40 meters and the VPL is less than 35 meters. The NSTB sites, Grand Forks and Arcata, are outliers due to receiver quality issues, not the WAAS signal in space quality.

| <b>Parameter</b>   | <b>CONUS Site/Maximum</b>     | <b>CONUS Site/Minimum</b>     | <b>Alaska Site/Maximum</b> | <b>Alaska Site/Minimum</b> |
|--|-------------------------------|-------------------------------|----------------------------|----------------------------|
| 95% Horizontal Accuracy (HPL <= 40 meters)                 | Atlantic City<br>1.415 meters | Kansas City<br>0.601 meters   | Juneau<br>0.738 meters     | Barrow<br>0.636 meters     |
| 95% Vertical Accuracy (VPL <= 50 meters)                   | Atlantic City<br>1.657 meters | Salt Lake City<br>0.85 meters | Barrow<br>1.455 meters     | Cold Bay<br>1.078 meters   |
| LP Availability (HPL <= 40 meters)                         | Multiple Sites<br>100%        | Grand Forks.<br>99.936%       | Barrow<br>99.99%           | Cold Bay<br>99.89%         |
| LPV Availability (HPL <= 40 meters & VPL <= 50 meters)     | Multiple Sites<br>100%        | Grand Forks<br>99.90%         | Barrow<br>99.92%           | Cold Bay<br>99.81%         |
| LPV 200 Availability (HPL <= 40 meters & VPL <= 35 meters) | Multiple Sites<br>100%        | Oakland<br>99.18%             | Fairbanks<br>99.87%        | Cold Bay<br>93.19%         |
| 99% HPL  | Miami<br>17.545 meters        | Memphis<br>11.52 meters       | Cold Bay<br>28.78 meters   | Fairbanks<br>15.11 meters  |
| 99% VPL  | Arcata<br>33.29 meters        | Memphis<br>19.08 meters       | Cold Bay<br>40.10 meters   | Juneau<br>24.38 meters     |

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## 1.0 INTRODUCTION

The FAA monitors WAAS and GPS SPS performance in order to ensure the safe and effective use of the satellite navigation system in the National Airspace System (NAS). The Wide Area Augmentation System (WAAS) adds more timely integrity monitoring of GPS and improves position accuracy and availability of GPS within the WAAS coverage area.

Objectives of this report are:

- a. To evaluate and monitor the ability of WAAS to augment GPS by characterizing important performance parameters.
- b. To analyze the effects of GPS satellite operation and maintenance, and ionospheric activity on the WAAS performance.
- c. To investigate any GPS and WAAS anomalies and determine their impact on potential users.
- d. To archive performance of GPS and WAAS for future evaluations.

The WAAS data transmitted from Geostationary satellites (GEO) PRN#135 (CRW), PRN#138 (CRE) and PRN#133 (AMR) are used in the evaluation. CRE and CRW GEOs provide a precision approach (PA) ranging capability that supports all levels of WAAS service. AMR GEO provides only non-precision approach (NPA) ranging service.

The terms "PA" and "NPA" are used in this report to refer to the two modes of user equipment operation. PA and NPA are terms used in the original WAAS specification, FAA-E-2892. See Table 1-1 for a mapping of these terms to the user service levels.

Receivers in PA mode are required to: use all WAAS corrections, use only corrected satellites, not mix corrections from multiple GEOs, only use the designated Space Based Augmentation System (SBAS) for the published approach procedure, and not use ranging from a GPS or GEO satellite having a User Differential Range Error (UDRE) status of greater than 15 meters. Receiver in NPA mode may: mix corrected and uncorrected satellites, mix corrections from different GEOs or SBASs, use either the WAAS ionosphere corrections or the GPS Klobuchar model for ionosphere corrections, and use ranging from a GPS or GEO satellite that have a UDRE status of greater than 15 meters. NPA mode receivers may also operate using Fault Detection / Fault Detection Exclusion (FD/FDE) in the absence of a SBAS. The data presented in this report does not take credit for the additional NPA mode availability and continuity provided by the use of FD/FDE, whether full FD/FDE or partial FD/FDE used to allow the mixing of corrected and uncorrected satellites. The NPA accuracy data presented in this report uses Klobuchar ionosphere corrections in order to be conservative.

The results in this report are based on the application of the WAAS corrections to receiver data from the WAAS receiver network and receivers of the FAA's National Satellite Test Bed (NSTB) network and from analysis based on the correction data broadcast by WAAS. Table 1-2 lists the receivers used in the PA analyses. Table 1-3 lists the receivers used in the NPA analyses.

**Table 1-1 WAAS Service Levels**

| User Service | NPA or PA | WAAS Protection Levels      |
|--------------|-----------|-----------------------------|
| RNP 0.3      | NPA       | HPL <= 0.3 nmi              |
| RNP 0.1      | NPA       | HPL <= 0.1 nmi              |
| LNAV         | NPA       | HPL <= 556 m                |
| LNAV/VNAV    | PA        | HPL <= 556 m<br>VPL <= 50 m |
| LP           | PA        | HPL <= 40 m                 |
| LPV          | PA        | HPL <= 40 m<br>VPL <= 50 m  |
| LPV200       | PA        | HPL <= 40 m<br>VPL <= 35 m  |

**Table 1-2 PA Evaluation Sites**

|                   | <b>Number of Days Evaluated</b> | <b>Number of Samples</b> |
|-------------------|---------------------------------|--------------------------|
| <b>NSTB:</b>      |                                 |                          |
| Arcata            | 78                              | 6696999                  |
| Atlantic City     | 91                              | 7822464                  |
| Grand Forks       | 82                              | 7051026                  |
| Oklahoma City     | 84                              | 7224776                  |
| <b>WAAS:</b>      |                                 |                          |
| Albuquerque       | 91                              | 7862294                  |
| Anchorage         | 91                              | 7862279                  |
| Atlanta           | 91                              | 7862396                  |
| Barrow            | 91                              | 7861800                  |
| Bethel            | 91                              | 7861648                  |
| Billings          | 91                              | 7862302                  |
| Boston            | 91                              | 7862375                  |
| Chicago           | 91                              | 7862398                  |
| Cleveland         | 91                              | 7851551                  |
| Cold Bay          | 91                              | 7855540                  |
| Dallas            | 91                              | 7860593                  |
| Denver            | 91                              | 7852541                  |
| Fairbanks         | 91                              | 7856244                  |
| Gander            | 91                              | 7862046                  |
| Goose Bay         | 91                              | 7855999                  |
| Houston           | 91                              | 7855269                  |
| Iqaluit           | 91                              | 7859581                  |
| Jacksonville      | 91                              | 7862400                  |
| Juneau            | 91                              | 7859615                  |
| Kansas City       | 91                              | 7862085                  |
| Kotzebue          | 91                              | 7862055                  |
| Los Angeles       | 91                              | 7862311                  |
| Memphis           | 91                              | 7862392                  |
| Merida            | 91                              | 7858868                  |
| Mexico City       | 90                              | 7757144                  |
| Miami             | 91                              | 7861056                  |
| Minneapolis       | 91                              | 7861276                  |
| New York          | 91                              | 7859739                  |
| Oakland           | 91                              | 7862212                  |
| Puerto Vallarta   | 91                              | 7851377                  |
| Salt Lake City    | 91                              | 7862378                  |
| San Jose Del Cabo | 91                              | 7846019                  |
| Seattle           | 91                              | 7861052                  |
| Washington DC     | 91                              | 7862136                  |
| Winnipeg          | 91                              | 7862329                  |

\*\*San Juan offline for roof reconstruction

**Table 1-3 NPA Evaluation Sites**

| <b>Location</b>   | <b>Number of Days Evaluated</b> | <b>Number of Samples</b> |
|-------------------|---------------------------------|--------------------------|
| Albuquerque       | 91                              | 7861549                  |
| Anchorage         | 91                              | 7859162                  |
| Atlanta           | 91                              | 7861542                  |
| Barrow            | 91                              | 7861208                  |
| Bethel            | 91                              | 7860653                  |
| Billings          | 91                              | 7861462                  |
| Boston            | 91                              | 7861446                  |
| Cleveland         | 91                              | 7859682                  |
| Cold Bay          | 91                              | 7846329                  |
| Fairbanks         | 91                              | 7858393                  |
| Gander            | 91                              | 7861549                  |
| Honolulu          | 91                              | 7861532                  |
| Houston           | 91                              | 7861550                  |
| Iqaluit           | 91                              | 7857397                  |
| Juneau            | 91                              | 7858362                  |
| Kansas City       | 91                              | 7860135                  |
| Kotzebue          | 91                              | 7861232                  |
| Los Angeles       | 91                              | 7861518                  |
| Merida            | 91                              | 7857996                  |
| Miami             | 91                              | 7860165                  |
| Minneapolis       | 91                              | 7861553                  |
| Oakland           | 91                              | 7859724                  |
| Salt Lake City    | 91                              | 7858461                  |
| San Jose Del Cabo | 91                              | 7859119                  |
| San Juan          | 91                              | 7861538                  |
| Seattle           | 91                              | 7860181                  |
| Tapachula         | 91                              | 7858261                  |
| Washington DC     | 91                              | 7861554                  |

The report is divided in the performance categories listed below.

1. WAAS Position Accuracy
2. WAAS Operational Service Availability
3. Coverage
4. Integrity
5. WAAS Range Domain Accuracy
6. GEO Ranging Performance
7. WAAS Airport Availability
8. WAAS CNMP Analysis
9. WAAS Antenna Survey Validation
10. SQM Analysis

Table 1-4 lists the performance parameters evaluated for the WAAS in this report. Please note that these are the performance parameters associated with the WAAS system. These requirements are extracted from the FAA Specification FAA-E-2892C and FAA Specification FAA-E-2976, as applicable.

**Table 1-4 WAAS Performance Parameters**

| <b>Performance Parameter</b>                            | <b>Expected WAAS Performance</b>             |
|---|--|
| LPV Accuracy Horizontal                                 | $\leq 1.5\text{m}$ error 95% of the time     |
| LPV Accuracy Vertical                                   | $\leq 2\text{m}$ error 95% of the time       |
| LNAV Accuracy Horizontal                                | $\leq 36\text{m}$ error 95% of the time      |
| Availability LPV CONUS                                  | 99% availability of 100% of CONUS            |
| Availability LPV Alaska                                 | 95% availability of 75% of Alaska            |
| Availability LNAV CONUS                                 | 99.99% availability with HPL $< 556\text{m}$ |
| Availability LNAV Alaska                                | 99.9% availability with HPL $< 556\text{m}$  |
| Availability En route OCONUS                            | 99.9% availability with HPL $< 2\text{nmi}$  |
| Probability of Hazardously Misleading Information (HMI) | $< 10\text{e-}7$ per approach                |

### 1.1 Event Summary

Table 1-5 lists events that affected WAAS performance or the ability to determine the WAAS performance during the reporting period. These events include GPS or WAAS anomalies, relevant receiver malfunctions, and receiver maintenance conducted. Detailed analyses of particular events are documented in the Discrepancy Reports (DR). The DRs are posted on the website <http://www.nstb.tc.faa.gov> under ‘WAAS Technical Reports’ and can also be accessed via hyperlink from Table 1-5 below. Please note “TOW” is the time of GPS week, which is the cumulative number of seconds since 00:00:00 Sunday (GMT without leap seconds).

Table 1-6 lists events related to WAAS upgrades that happened this quarter. Table 1-7 lists events related to GUS switchovers. A GUS switchover is the transition from one uplink site to the other uplink site for a GEO.

**Table 1-5 Events**

| <b>Start Date</b> | <b>End Date</b> | <b>Location/<br/>Satellite</b>                    | <b>Service Affected</b> | <b>Event Description</b>   |
|-------------------|-----------------|---|-------------------------|--|
| 04/02/13          | 04/02/13        | Boston (ZBW1),<br>Boston (ZBW2),<br>Boston (ZBW3) | Local                   | RFI caused a brief (57 sec) local outage of the LPV and LPV-200 levels of service at the Boston reference station.   |
| 04/04/13          | 04/04/13        | PRN18   | LPV_Canada              | Unavailability of GPS PRN-18 due to planned maintenance (see NANU 2013024) resulted in minor LPV service outages in southern California / North Western Mexico and extreme Eastern Canada. The maintenance also caused significant LPV-200 service outages for Western CONUS / Mexico, Eastern Canada, and Northern Alaska.<br><br>See the following plots for LPV and LPV-200 service impacts:<br><a href="#">LPV_coverage_040413</a><br><a href="#">LPV200_coverage_040413</a> |

| <b>Start Date</b> | <b>End Date</b> | <b>Location/<br/>Satellite</b>                                   | <b>Service Affected</b>                        | <b>Event Description</b>  |
|-------------------|-----------------|--|--|---|
|                   |                 |  |  | See the following plots for the duration of service outage: <a href="#">CONUS_outage_040413</a>   |
| 04/11/13          | 04/12/13        | PRN8   | LPV200_CONUS,<br>LPV200_Mexico                 | <p>Planned maintenance for PRN-8 (delta V maneuver, NANU 2013026) resulted in a moderate outage of the LPV-200 level of service in south central CONUS and northern Mexico.</p> <p>See the following plot for the impacted locations: <a href="#">LPV200_coverage_041113</a></p> <p>See the following plot for the duration (02:00 to 03:00 event): <a href="#">CONUS_outage_041113</a></p>   |
| 04/12/13          | 04/12/13        | GEO138,<br>Brewster (BRE-B)                                      | LPV200_Alaska<br>LPV200_Canada                 | Geomagnetic activity ( $K_p = 3$ ) caused minor degradation in LPV-200 service coverage in far northern Alaska and north eastern Canada starting at approximately at 8:00 GMT due to elevated GIVE values.  |
| 04/13/13          | 04/13/13        | Salt Lake City<br>(ZLC1, ZLC2,<br>ZLC3)                          | Local  | RFI caused a brief (66 sec) local outage of the LPV and LPV200 levels of service at the Salt Lake City (ZLC) reference station location.  |
| 04/24/13          | 04/24/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV200_All                                     | <p>Geomagnetic activity (<math>K_p = 4</math>) disturbed the ionosphere resulting in elevated GIVE values which resulted in short LPV-200 service outages for; northern Alaska, northern Canada, southern Mexico, the Gulf of Mexico and the southern tip of Florida.</p> <p>See the following plot for the locations of the outages: <a href="#">LPV200_coverage_042413</a></p>  |
| 04/25/13          | 04/26/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV200_Alaska,<br>LPV200_Canada                | <p>Geomagnetic activity (<math>K_p = 3</math> on 4/25 and <math>K_p = 5</math> on 4/26) caused slightly elevated GIVE values which resulted in a minor degradation of LPV-200 service availability in northern Alaska and northern Canada.</p> <p>See the following plots for impacts for the two days: <a href="#">LPV200_coverage_042513</a><br/><a href="#">LPV200_coverage_042613</a></p>   |
| 05/01/13          | 05/01/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV_Canada,<br>LPV200_Alaska,<br>LPV200_Canada | <p>Geomagnetic activity (<math>K_p = 4</math>) caused the mild disturbances to the ionosphere in the polar region. The disturbed ionosphere resulted in WAAS broadcasting elevated GIVE values for the northern Ionosphere Grid Points (IGPs). This resulted in shrinkage of the WAAS LPV and LPV-200 service area coverage along the northern edge of the Canada service area, a brief LPV-200 service outage between Hudson Bay and the Great Lakes, and a minor degradation of LPV-200 service in northern Alaska.</p> <p>For the LPV service impact to northern Canada see:</p> |

| Start Date | End Date | Location/<br>Satellite   | Service Affected  | Event Description  |
|------------|----------|--|---|--|
|            |          |  |   | <p><a href="#">LPV_coverage_050113</a></p> <p>For the LPV-200 service impacts see :<br/> <a href="#">LPV200_coverage_050113</a></p>  |
| 05/04/13   | 05/04/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)       | LPV200_Alaska,<br>LPV200_Canada                                 | <p>Slightly elevated GIVE values resulted in degradation of the LPV-200 service coverage in northern Alaska and northern Canada.</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_050413</a></p>   |
| 05/07/13   | 05/07/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)       | LPV200_Alaska,<br>LPV200_Canada                                 | <p>Elevated GIVEs associated with mild geomagnetic activity (<math>K_p = 3</math>) resulted in degradation to the LPV-200 service coverage in northern Alaska and northern Canada.</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_050713</a></p>   |
| 05/10/13   | 05/10/13 | PRN25  | LPV_Alaska,<br>LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada | <p>Planned maintenance on PRN-25 (Delta V maneuver, NANU 2013030) resulted in degradation of the LPV-200 service to the west coast of CONUS, Mexico, and Alaska. It also caused degradation of the LPV service to the south west tips of mainland Alaska and the Aleutian peninsula.</p> <p>See the following for the LPV and LPV-200 impacts:<br/> <a href="#">LPV_coverage_051013</a><br/> <a href="#">LPV200_coverage_051013</a>:</p>   |
| 05/10/13   | 05/11/13 | Iqaluit (YFB1),<br>Iqaluit (YFB2),<br>Iqaluit (YFB3)                   | LPV_Canada,<br>LPV200_Canada                                    | <p>Intermittent communication outages to the Iqaluit Canada reference station (YFB) resulted in temporary losses of service for that reference station. Loss of the service of the YFB reference station resulted in significant degradation of the LPV and LPV-200 service for Canada on May 10th and 11th.</p> <p>See the following for the service impacts:<br/> <a href="#">LPV_coverage_051013</a><br/> <a href="#">LPV_coverage_051113</a><br/> <a href="#">LPV200_coverage_051013</a><br/> <a href="#">LPV200_coverage_051113</a></p> |
| 05/13/13   | 05/13/13 | Los Angeles<br>(ZLA1), Los<br>Angeles (ZLA2),<br>Los Angeles<br>(ZLA3) | Local   | <p>Brief RFI on the L2 frequency at the Los Angles (Palmdale) reference station (ZLA) caused an outlier in the position accuracy analyses for the maximum vertical error (processing uses dual frequency smoothing to mitigate ground based multipath on the L1 signal). Source of L2 RFI was not identified.</p>  |
| 05/15/13   | 05/15/13 | GEO138,<br>Woodbine<br>(QWE)   | LPV_All,<br>LPV200_All  | <p>GUS hardware failure of PNE caused missed navigation messages:</p> <p>5 missed messages at 268354 (2:32), 4 missed messages at 328200 (19:09), 2 missed messages at 328208, and 2 missed messages at 328716.</p>  |

| Start Date | End Date | Location/<br>Satellite   | Service Affected   | Event Description   |
|------------|----------|--|--|---|
|            |          |  |  | <a href="#">See DR 114 "LPV Service Outage Due to Consecutive SV Alerts on PRN 138"</a> for a more detailed description.  |
| 05/16/13   | 05/19/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV_Alaska,<br>LPV200_Alaska,<br>LPV200_Canada                     | High KP all 4 days (KP = 3, 4, 5). Loss of LPV200 coverage in Canada and Alaska. On May 19th, LPV coverage was also affected in Alaska.   |
| 05/23/13   | 05/23/13 | Miami (ZMA1),<br>Miami (ZMA2),<br>Miami (ZMA3)                   | Local  | RFI event at Miami caused LPV/LPV200 service outages at all three threads on receiver. Threads A and C were put into maintenance due to alerts on the CnVs, although this is not normally the procedure.<br><br>All CVs report SE-709 PID Alert for WRE-A/C. WMS: ZTL/ZLA/ZDC SE 721 WRS Down/Out of Service. Performed software Shutdown and Cntrl Pwr. at 1426Z   |
| 05/24/13   | 05/24/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV200_Alaska,<br>LPV200_Canada,<br>LPV200_Mexico                  | Geomagnetic activity (Kp = 5) caused the ionosphere to be disturbed which resulted in WAAS broadcasting elevated GIVE values. This resulted in minor degradations of the LPV-200 service coverage along the northern edge of coverage for Alaska and Canada and along the southern edge of coverage for Mexico.<br><br>See the following for the service impacts:<br><a href="#">LPV200 coverage 052413</a>   |
| 05/25/13   | 05/25/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV200_All   | Geomagnetic activity (Kp = 5) caused the ionosphere to be disturbed which resulted in WAAS broadcasting elevated GIVE values. This resulted in minor degradations of the LPV-200 service coverage along the northern edge of coverage for Alaska and along the southern edge of coverage for Mexico and the Florida Keys. There was moderate degradation to the LPV-200 service for Canada.<br><br>See the following for the LPV-200 service impacts:<br><a href="#">LPV200 coverage 052513</a>   |
| 05/26/13   | 05/26/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada,<br>LPV200_Mexico | Geomagnetic activity (Kp = 4) caused mild disturbances to the ionosphere which resulted in WAAS broadcasting elevated GIVE values. The elevated GIVE values caused degradation to the LPV-200 service coverage in north eastern Alaska, north western Canada, and along the southern edge of coverage for Mexico. There was also a minor increase in the size of the daily LPV-200 outage that occurs along the coast of northern California.<br><br>See the following for the LPV-200 service impacts:<br><a href="#">LPV200 coverage 052613</a> |
| 05/27/13   | 05/27/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),                  | LPV200_Alaska,<br>LPV200_Canada,<br>LPV200_Mexico                  | Geomagnetic activity (Kp = 4) caused mild disturbances to the ionosphere which resulted in WAAS broadcasting elevated GIVE values. The elevated GIVE values   |

| <b>Start Date</b> | <b>End Date</b> | <b>Location/<br/>Satellite</b>                                   | <b>Service Affected</b>                          | <b>Event Description</b>  |
|-------------------|-----------------|--|--|---|
|                   |                 | Atlanta (CnV)  |  | <p>caused minor degradation to the LPV-200 service coverage along the edges of coverage for Alaska, Mexico, California, and Canada. Canada also experienced slightly worse LPV-200 service coverage degradation with additional minor outages in central Canada and central north Canada.</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_052713</a></p>   |
| 05/30/13          | 05/30/13        | GEO138,<br>Woodbine<br>(QWE)                                     | LPV200_Canada                                    | Manually initiated switchover of the uplink sites for the AMR GEO, PRN-138, from the Woodbine ,MD uplink site to the Brewster-B, WA uplink site. TOW 374487-374492  |
| 05/30/13          | 05/30/13        | PRN21  | LPV200_CONUS                                     | <p>Carrier phase instability on PRN-21 resulted in WAAS alerting PRN-21 to "Not Monitored" twice, once at 10:12:58 UTC and another at 10:13:34 UTC. The temporary loss of service from PRN-21 resulted in an approximately 500 second LPV-200 service outage for most of Florida and a small area of southern Georgia.</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_053013</a></p>  |
| 06/01/13          | 06/01/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV) | LPV_All,<br>LPV200_All                           | <p>Strong geomagnetic activity (<math>K_p = 6</math>) caused significant disturbance to the ionosphere which resulted in WAAS setting the GIVE values for a large number of IGPs to 45 meters (ionosphere storm condition) for a prolonged period of time. This resulted in significant LP, LPV, and LPV-200 outages for CONUS, Alaska, Canada, and Mexico.</p> <p>See DR 115 "Effect on WAAS from Iono Activity on 01June2013" for a more detailed description.</p> <p>See the following for the coverage vs. time impacts:<br/> <a href="#">CONUS_outage_060113</a><br/> <a href="#">Alaska_outage_060113</a><br/> <a href="#">Canada_outage_060113</a></p> <p>See the following for the locations of the service impacts:<br/> <a href="#">LPV_coverage_060113</a><br/> <a href="#">LPV200_coverage_060113</a></p> |
| 06/02/13          | 06/03/13        | GEO135, NAPA<br>(APC)  | LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada | <p>Manually initiated switchover of the uplink site for the CRW GEO, PRN-135, from Napa CA to Littleton CO. TOW 41732-41737</p> <p>Uplink switchovers interrupt the data link for several seconds and restart the carrier smoothing algorithms. Restarting the carrier smoothing results in high UDRE values for about 6 hours and full ranging performance is not achieved until about 36 hours. The elevated UDRE</p>   |

| <b>Start Date</b> | <b>End Date</b> | <b>Location/<br/>Satellite</b>  | <b>Service Affected</b>        | <b>Event Description</b>  |
|-------------------|-----------------|---|--------------------------------|---|
|                   |                 |   |                                | <p>value for PRN-135 resulted in brief, isolated LPV-200 outages in central CONUS and the Great Lakes region of CONUS / Canada. The elevated UDRE also contributed to LPV-200 service coverage degradation in northern Alaska, but the locations in Alaska are not discernible on the plot because those locations overlap with the larger outage event from geomagnetic activity that occurred on the same day (Event 10348).</p> <p>See the following for the CONUS and Canada LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_060213</a></p> |
| 06/02/13          | 06/02/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)            | LPV200_Alaska                  | <p>Geomagnetic activity (<math>K_p = 5</math>) caused mild a disturbance to the ionosphere which caused WAAS to broadcast elevated GIVE values for several IGP. The elevated GIVEs resulted in a brief degradation of the LPV-200 service in north western Alaska (CONUS and Canada outages on plot are from the CRW GUS switch, Event 10345).</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_060213</a></p>  |
| 06/03/13          | 06/03/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV),<br>PRN135 | RNP1_All                       | <p>Elevated UDREs on CRW GEO PRN-135 (see Event 10345) caused a two minute RNP 0.1 coverage outage to be observed at sample location, Latitude = N20 degrees, Longitude = W160 degrees.</p> <p>See the following for the RNP 0.1 service impact:<br/> <a href="#">RNP0.1_coverage_060313</a></p>  |
| 06/05/13          | 06/05/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)            | LPV200_Alaska                  | <p>Elevated GIVEs caused a degradation of the LPV-200 service coverage in north western Alaska.</p> <p>See the following for the location and duration of the LPV-200 service impact:<br/> <a href="#">LPV200_coverage_060513</a><br/> <a href="#">Alaska_outage_060513</a></p>   |
| 06/07/13          | 06/07/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)            | LPV200_Canada                  | <p>Moderate geomagnetic activity (<math>K_p = 6</math>) caused a mild disturbance to the ionosphere which caused WAAS to broadcast elevated GIVE values for several northern IGP. The elevated GIVEs resulted in degraded coverage for the LPV-200 service. Elevated vertical errors were also observed for the Billings (BIL) and Denver (ZDV) reference station locations.</p> <p>See the following for the LPV-200 service impacts:<br/> <a href="#">LPV200_coverage_060713</a></p>  |
| 06/08/13          | 06/08/13        | PRN21   | LPV200_CONUS,<br>LPV200_Mexico | <p>Carrier phase instability on PRN-21 resulted in WAAS alerting PRN-21 to "Not Monitored" at 5:45:52. The temporary loss of service from PRN-21 resulted in brief LPV-200 service outage for Mexico and south west CONUS. (19 minutes at Mexico City)</p>  |

| Start Date | End Date | Location/<br>Satellite  | Service Affected  | Event Description  |
|------------|----------|---|---|--|
|            |          |   |   | <p>See the following for the LPV-200 service impacts:</p> <p><a href="#">LPV200 coverage 060813</a></p> <p><a href="#">CONUS outage 060813</a></p>   |
| 06/10/13   | 06/10/13 | Boston (ZBW1),<br>Boston (ZBW2),<br>Boston (ZBW3)   | Local   | <p>RFI observed at the Boston reference station (ZBW) caused a short (55 second) loss of LPV-200 service for all three receivers. Thread B also lost LPV service and thread C temporarily stopped tracking all the satellites.</p>   |
| 06/12/13   | 06/13/13 | GEO135,Littleton<br>(APA)   | LPV_Alaska,<br>LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada | <p>Switchover of the uplink site for the CRW GEO, PRN-135, from Littleton CO to Napa CA due to a failure at Littleton. TOW 316329-316342</p> <p>Uplink switchovers interrupt the data link for several seconds and restart the carrier smoothing algorithms. Restarting the carrier smoothing results in high UDRE values for about 6 hours and full ranging performance is not achieved until about 36 hours.</p> <p>The elevated UDRE value for PRN-135 overlapped with the PRN-4 maintenance on 6/12/13, causing the LPV-200 service coverage degradation for CONUS, Canada, and north west Alaska and LPV service coverage degradation for northwestern Alaska. On the following day, 6/13/13, the PRN-135 GEO UDRE was still elevated and resulted in brief LPV-200 service coverage degradation for isolated areas in central CONUS, Canada, and north west Alaska.</p> <p>For 6/12/13 see the following for the LPV and LPV-200 service impacts:</p> <p><a href="#">LPV coverage 061213</a></p> <p><a href="#">LPV200 coverage 061213</a></p> <p>For 6/13/12 see the following for the LPV-200 service impacts:</p> <p><a href="#">LPV200 coverage 061313</a></p> |
| 06/13/13   | 06/14/13 | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV),<br>PRN135   | RNP1_All  | <p>Elevated UDREs on CRW GEO PRN-135 caused a 90 second 0.1 coverage outage to be observed at sample location, Latitude = N20 degrees, Longitude = W160 degrees.</p> <p>See the following for the RNP 0.1 service impact:</p> <p><a href="#">RNP0.1 coverage 061313</a></p>  |
| 06/14/13   | 06/15/13 | Bethel (BET1),<br>Bethel (BET2),<br>Bethel (BET3),<br>Cold Bay<br>(CDB1), Cold<br>Bay (CDB2),<br>Cold Bay<br>(CDB3), Juneau | LPV_Alaska,<br>LPV200_Alaska                                    | <p>Elevated GIVEs caused degradation of the LPV and LPV-200 service coverage for south west Alaska and the eastern Aleutian peninsula. There were communication outages to the Juneau AK and Cold Bay AK reference stations that may have been the cause of the elevated GIVEs.</p> <p>See the following for the LPV and LPV-200 service</p>   |

| <b>Start Date</b> | <b>End Date</b> | <b>Location/<br/>Satellite</b>  | <b>Service Affected</b>  | <b>Event Description</b>  |
|-------------------|-----------------|---|--|---|
|                   |                 | (JNU1), Juneau<br>(JNU2), Juneau<br>(JNU3)                                  |  | impacts:<br><a href="#">LPV coverage 061413</a><br><a href="#">LPV200 coverage 061413</a>   |
| 06/21/13          | 06/21/13        | Boston (ZBW1),<br>Boston (ZBW2),<br>Boston (ZBW3)                           | Local  | RFI observed at the Boston reference station (ZBW) caused a brief (58 second) local outage of the LPV-200 service.  |
| 06/21/13          | 06/21/13        | PRN27   | None   | GPS IIF-4 SVN-66 PRN-27 which had been launched May 15, 2013 was set to healthy for the first time for slot C2.   |
| 06/23/13          | 06/23/13        | Washington D.C.<br>(CnV), Los<br>Angeles (CnV),<br>Atlanta (CnV)            | LPV200_Alaska  | Mild geomagnetic activity ( $K_p = 4$ ) caused a minor disturbance of the ionosphere which resulted in WAAS broadcasting elevated GIVE values for a couple northern IGPs. This resulted in a small degradation of the LPV-200 service coverage in northern Alaska and north western Canada.<br><br>See the following for the LPV-200 service impacts:<br><a href="#">LPV200 coverage 062313</a>   |
| 06/24/13          | 06/24/13        | PRN32   | LPV200_Alaska,<br>LPV200_Canada  | A carrier phase glitch on PRN-32 resulted in 103 of the 109 receivers tracking PRN-32 to lose track and need to reacquire PRN-32. This resulted in WAAS alarming PRN-32 to the Not Monitored condition at 12:28:55. The temporary loss of PRN-32's service resulted in degradation to the LPV-200 service coverage for northern Alaska, along the northern edge of coverage for Canada and at a spot in central Canada.<br><br>See the following for the LPV-200 impacts:<br><a href="#">LPV200 coverage 062413</a>   |
| 06/28/13          | 06/29/13        | Washington D.C.<br>(CnV),<br><br>Los Angeles<br>(CnV),<br><br>Atlanta (CnV) | LPV_CONUS,<br>LPV_Alaska,<br>LPV_Canada,<br>LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada | Strong geomagnetic activity on 6/29/13 $K_p = 5$ , and 6/29/13 $K_p = 7$ , caused WAAS to set the numerous IGPs to the 45 meter ionosphere storm value for prolonged periods. This resulted in large degradations to the LP, LPV, and LPV-200 service coverage areas for CONUS, Alaska, and Canada.<br><br>See the following for the 6/28/13 impacts:<br><a href="#">LP coverage 062813</a><br><a href="#">LPV coverage 062813</a><br><a href="#">LPV200 coverage 062813</a><br><br>See the following for the 6/29/13 impacts:<br><a href="#">LP coverage 062913</a><br><a href="#">LPV coverage 062913</a><br><a href="#">LPV200 coverage 062913</a> |

**Table 1-6 WAAS Upgrades**

There are no WAAS upgrades for this quarter.

**Table 1-7 GUS Switchovers**

| <b>Start Date</b> | <b>End Date</b> | <b>GUS Switch</b> | <b>Location/<br/>Satellite</b> | <b>Service Affected</b>                    | <b>Event Description</b>  |
|-------------------|-----------------|-------------------|--------------------------------|--|---|
| 04/12/13          | 04/12/13        | Manual            | GEO138, Brewster (BRE-B)       | Canada                                     | <p>CRE GEO, PRN-138, manual switchover of the uplink location from the Brewster-B uplink site to Woodbine resulted in a short loss of WAAS service (&lt;18 seconds) to the locations in north eastern Canada where only one WAAS GEO is visible; coverage in Alaska was not affected.<br/>TOW 448233-448238</p> <p>See the following plot for the service impacts: <a href="#">LPV_coverage_041213</a></p>  |
| 05/01/13          | 05/01/13        | Manual            | GEO133,Pamalu (HDH)            | None                                       | AMR GEO, PRN-133, manual switchover of the uplink from the Pamalu, HI uplink site to the Santa Paula, CA uplink site had no impact. TOW 288027-288035   |
| 05/16/13          | 05/16/13        | Manual            | GEO138,Woodbine (QWE)          | None                                       | GEO 138, manual switchover of the uplink site from Woodbine to Brewster-B had no impact. TOW 407407-407412  |
| 05/26/13          | 05/26/13        | Faulted           | GEO138, Brewster (BRE-B)       | None                                       | Uplink site for CRE GEO, PRN-138, switched from the Brewster-B WA uplink site to the Woodbine, MD uplink site due to a hardware failure (C5 up-converter) at the Brewster location had no impact. TOW 6053-6065   |
| 05/30/13          | 05/30/13        | Manual            | GEO138,Woodbine (QWE)          | LPV200_Canada                              | <p>Manually initiated switchover of the uplink sites for the AMR GEO, PRN-138, from the Woodbine, MD uplink site to the Brewster-B WA uplink site. TOW 374487-374492</p> <p>See the following plot for the service impacts: <a href="#">LPV200_coverage_053013</a></p>  |
| 06/02/13          | 06/03/13        | Manual            | GEO135, NAPA (APC)             | LPV200_CONUS, LPV200_Alaska, LPV200_Canada | <p>Manually initiated switchover of the uplink site for the CRW GEO, PRN-135, from Napa, CA to Littleton, CO. TOW 41732-41737</p> <p>Uplink switchovers interrupt the data link for several seconds and restart the carrier smoothing algorithms. Restarting the carrier smoothing results in high UDRE values for about 6 hours and full ranging performance is not achieved until about 36 hours. The elevated UDRE value for PRN-135 resulted in brief, isolated LPV-200</p> |

| Start Date | End Date | GUS Switch | Location/<br>Satellite    | Service Affected  | Event Description  |
|------------|----------|------------|---------------------------|---|--|
|            |          |            |                           |   | <p>outages in central CONUS and the Great Lakes region of CONUS / Canada. The elevated UDRE also contributed to LPV-200 service coverage degradation in northern Alaska, but the locations in Alaska are not discernible on the plot because those locations overlap with the larger outage event from geomagnetic activity that occurred on the same day (Event 10348).</p> <p>See the following for the CONUS and Canada LPV-200 service impacts:<br/> <a href="#">LPV200 coverage 060213</a></p>  |
| 06/12/13   | 06/13/13 | Faulted    | GEO135,Littleton (APA)    | LPV_Alaska,<br>LPV200_CONUS,<br>LPV200_Alaska,<br>LPV200_Canada | <p>Switchover of the uplink site for the CRW GEO, PRN-135, from Littleton CO to Napa CA due to a failure at Littleton. TOW 316329-316342</p> <p>Uplink switchovers interrupt the data link for several seconds and restart the carrier smoothing algorithms. Restarting the carrier smoothing results in high UDRE values for about 6 hours and full ranging performance is not achieved until about 36 hours.</p> <p>The elevated UDRE value for PRN-135 overlapped with the PRN-4 maintenance on 6/12/13, causing the LPV-200 service coverage degradation for CONUS, Canada, and north west Alaska and LPV service coverage degradation for northwestern Alaska. On the following day, 6/13/13, the PRN-135 GEO UDRE was still elevated and resulted in brief LPV-200 service coverage degradation for isolated areas in central CONUS, Canada, and north west Alaska.</p> <p>For 6/12/13 see the following for the LPV and LPV-200 service impacts:<br/> <a href="#">LPV coverage 061213</a><br/> <a href="#">LPV200 coverage 061213</a></p> <p>For 6/13/12 see the following for the LPV-200 service impacts:<br/> <a href="#">LPV200 coverage 061313</a></p> |
| 06/17/13   | 06/17/13 | Manual     | GEO133, Santa Paula (SZP) | None  | Manual switch of the uplink site for the AMR GEO, PRN-133, from the Santa Paula,CA uplink site to the Pamalu, HI uplink site had no impact. TOW 92346-92351  |

## 1.2 Report Overview

Section 2 documents the LPV and NPA performance observed for the indicated receiver locations (see Tables 1-2 and 1-3). The 95% accuracy index and the maximum inaccuracy for the reporting period are tabulated. The daily 95% accuracy index is plotted for each receiver. Histograms of the vertical and horizontal error distribution using the data from all the evaluated receivers are provided..

Section 3 summarizes the WAAS instantaneous availability performance, at each receiver, for three operational service levels during the reporting period. Daily availability is also plotted for each receiver evaluated. The number of outages and outage rate for each site is reported.

Section 4 provides geographic plots of the availability of the WAAS services rolled up for the quarter. Plots of the percent of the CONUS and Alaska service areas covered by various levels of service availability are provided.

Section 5 summarizes the number of HMI events detected during the reporting period and presents a safety margin index for each receiver. The safety margin index reflects the amount of over bounding of position error by WAAS protection levels. This section also includes update rates of WAAS messages transmitted from CRE, CRW, and AMR.

Section 6 provides the UDRE and GIVE bounding percentage and the 95% index of the range and ionospheric accuracy for each satellite tracked by the WAAS receiver at 12 locations.

Section 7 provides the GEO ranging performance for CRE and CRW.

Section 8 provides WAAS LPV availability and outages at selected airports.

Section 9 provides the assessment of WAAS CNMP bounding for the 114 WAAS receivers.

Section 10 provides the surveyed positions of all WREs and the difference between the WRE survey positions in the current operational software and the survey positions in this report.

Section 11 provides the daily and quarterly average of SQM PRN type biases and PRN biases.

## 2.0 WAAS POSITION ACCURACY

Navigation error data, collected from WAAS and NSTB reference stations, was processed to determine position accuracy at each location. This was accomplished by utilizing the GPS/WAAS position solution tool to compute a RTCA DO-229D weighted least squares user navigation solution, and WAAS horizontal and vertical protection levels (HPL & VPL), once every second. The user position calculated for each receiver was compared to the surveyed position of the antenna to assess position error associated with the WAAS SIS over time. The position errors were analyzed and statistics were generated for the operational service levels shown in Table 1-1.

Table 2-1 shows PA horizontal and vertical position accuracy maintained for 95% of the time at LP, LPV and LNAV/VNAV operational service levels for the quarter. The table also includes 95% SPS accuracy for certain locations. Figures 2-1 to 2-6 show the daily horizontal and vertical 95% accuracy for LPV operational service level for the period. Note that WAAS accuracy statistics presented are compiled only when all WAAS corrections (fast, long term, and ionospheric) for at least 4 satellites are available. This is referred to as PA navigation mode. The percentage of time that PA navigation mode was supported by WAAS at each receiver is also shown in Table 2-1. A user is considered to be in NPA navigation mode if only WAAS fast and long term corrections are available to a user (i.e. no ionospheric corrections). Table 2-2 shows NPA horizontal position accuracy for 95% and 99.999% of the time. This table also shows the maximum NPA horizontal position error for the quarter. Figures 2-7 to 2-8 show the daily horizontal 95% accuracy for NPA.

Table 2-3 shows the maximum LPV error statistics. The column marked ‘Horizontal Error’ shows the maximum position errors while the calculated HPL meets the LPV service level defined in Table 1-1. The column marked ‘Vertical Error’ shows the maximum position errors while the calculated VPL meets the LPV service level. The columns marked ‘Horizontal Error/HPL’ and ‘Vertical Error/VPL’ show the ratio of position error to protection level at the time the maximum error occurred. The columns marked ‘Horizontal Maximum Ratio’ and ‘Vertical Maximum Ratio’ show the maximum position error to protection level ratio for the quarter.

During this reporting period, the maximum 95% CONUS horizontal and vertical LPV errors are 1.415 meters and 1.657 meters, both at Atlantic City. The minimum 95% CONUS horizontal and vertical LPV errors are 0.601 meters at Kansas City and 0.85 meters at Salt Lake City, respectively. The maximum 95% and 99.999% NPA horizontal errors are 5.594 meters and 10.89, both at Honolulu. The minimum 95% and 99.999% horizontal errors are 1.29 meters at Kansas City and 3.882 meters at Albuquerque, respectively.

The increases in 95% position errors on 4/24/2013, 6/1/2013, 6/7/2013, 6/28/2013, and 6/29/2013 in Figure 2.1 to 2.8 are due to geomagnetic activity. The increase in 95% NPA position errors on 6/1/2013, 6/7/2013, and 6/29/2013 in Figure 2.7-2.8 are also due to geomagnetic activity. The increase in 95% NPA position errors in CONUS on 5/24/2013 and 6/7/2013 in Figure 2.7-2.8 are due to geomagnetic activity as well.

Figures 2-9 to 2-12 show the distributions of the vertical and horizontal errors at all 38 WAAS receiver locations combined in triangle charts and 2-D histogram plots for the quarter. The triangle charts in Figures 2-9 and 2-10 show the distributions of vertical position errors (VPE) versus vertical protection levels (VPL) and horizontal position errors (HPE) versus horizontal protection levels (HPL). The horizontal axis is the position error and the vertical axis is the WAAS protection levels. Lower protection levels equate to better availability. The diagonal line shows the point where error equals protection level. Above and to the left of the diagonal line in the chart, errors are bounded (WAAS is providing integrity in the position domain); below and to the right, errors are not bounded (HMI could be present). The 2-D histogram plots in Figures 2-11 to 2-12 show the distributions of vertical and horizontal position errors and normalized position errors. The blue trace shows the distributions of the actual vertical and horizontal errors. The horizontal axis is the position errors and the vertical axis is the total count of data samples (log scale) in each 0.1-meter bin. The magenta trace shows the distributions of the actual vertical and horizontal errors normalized by one-sigma value of the protection level; vertical - (VPL/5.33) and horizontal - (HPL/6.0). The horizontal axis is the standard units and vertical axis is the observed distribution of normalized errors data samples in each 0.1-sigma bin. Narrowness of the normalized error distributions shows very good observed safety performance.

**Table 2-1 PA 95% Horizontal and Vertical Accuracy**

| Location          | Horizontal<br>(HAL=40m)<br>(Meters) | Horizontal<br>(HAL=556m)<br>(Meters) | Vertical<br>(VAL=50m)<br>(Meters) | Percentage<br>in PA mode<br>(%) | SPS<br>Accuracy               |                             |
|-------------------|-------------------------------------|--------------------------------------|-----------------------------------|---------------------------------|-------------------------------|-----------------------------|
|                   |                                     |                                      |                                   |                                 | 95%<br>Horizontal<br>(Meters) | 95%<br>Vertical<br>(Meters) |
| Arcata            | 1.241                               | 1.241                                | 1.574                             | 100                             | *                             | *                           |
| Atlantic City     | 1.415                               | 1.415                                | 1.657                             | 100                             | *                             | *                           |
| Grand Forks       | 1.096                               | 1.098                                | 1.418                             | 100                             | *                             | *                           |
| Oklahoma City     | 0.925                               | 0.925                                | 1.290                             | 100                             | *                             | *                           |
| Albuquerque       | 0.662                               | 0.662                                | 1.191                             | 100                             | 2.703                         | 4.215                       |
| Anchorage         | 0.732                               | 0.734                                | 1.436                             | 100                             | *                             | *                           |
| Atlanta           | 0.657                               | 0.657                                | 1.171                             | 100                             | 2.703                         | 4.215                       |
| Barrow            | 0.636                               | 0.636                                | 1.455                             | 99.999910                       | *                             | *                           |
| Bethel            | 0.669                               | 0.671                                | 1.090                             | 100                             | 2.970                         | 3.651                       |
| Billings          | 0.840                               | 0.840                                | 0.930                             | 99.999980                       | 2.067                         | 3.778                       |
| Boston            | 0.760                               | 0.760                                | 1.125                             | 100                             | 2.494                         | 3.860                       |
| Chicago           | 0.885                               | 0.885                                | 0.901                             | 100                             | *                             | *                           |
| Cleveland         | 0.689                               | 0.689                                | 1.027                             | 100                             | 2.359                         | 3.867                       |
| Cold Bay          | 0.676                               | 0.678                                | 1.078                             | 100                             | *                             | *                           |
| Dallas            | 0.701                               | 0.701                                | 1.337                             | 100                             | *                             | *                           |
| Denver            | 0.626                               | 0.626                                | 0.912                             | 100                             | *                             | *                           |
| Fairbanks         | 0.723                               | 0.723                                | 1.549                             | 100                             | 3.025                         | 3.665                       |
| Gander            | 0.839                               | 0.839                                | 1.261                             | 100                             | *                             | *                           |
| Goose Bay         | 0.836                               | 0.837                                | 1.101                             | 100                             | *                             | *                           |
| Houston           | 0.940                               | 0.940                                | 1.606                             | 100                             | 3.399                         | 4.661                       |
| Iqaluit           | 0.767                               | 0.768                                | 1.457                             | 100                             | *                             | *                           |
| Jacksonville      | 0.746                               | 0.746                                | 1.359                             | 100                             | *                             | *                           |
| Juneau            | 0.738                               | 0.739                                | 1.242                             | 100                             | *                             | *                           |
| Kansas City       | 0.601                               | 0.601                                | 0.981                             | 100                             | 2.252                         | 3.975                       |
| Kotzebue          | 0.726                               | 0.726                                | 1.451                             | 99.999910                       | 3.148                         | 3.778                       |
| Los Angeles       | 0.687                               | 0.687                                | 1.410                             | 99.999980                       | 3.116                         | 4.423                       |
| Memphis           | 0.708                               | 0.708                                | 1.040                             | 100                             | *                             | *                           |
| Merida            | 0.885                               | 0.885                                | 1.787                             | 100                             | *                             | *                           |
| Mexico City       | 0.859                               | 0.861                                | 2.479                             | 99.999970                       | *                             | *                           |
| Miami             | 0.977                               | 0.977                                | 1.560                             | 100                             | 3.876                         | 5.099                       |
| Minneapolis       | 0.765                               | 0.766                                | 0.953                             | 100                             | 2.126                         | 3.734                       |
| New York          | 0.799                               | 0.799                                | 1.062                             | 100                             | *                             | *                           |
| Oakland           | 0.723                               | 0.723                                | 1.432                             | 99.999980                       | 2.788                         | 4.431                       |
| Puerto Vallarta   | 0.929                               | 0.935                                | 2.355                             | 100                             | *                             | *                           |
| Salt Lake City    | 0.681                               | 0.681                                | 0.850                             | 99.999980                       | 2.212                         | 3.921                       |
| San Jose Del Cabo | 0.981                               | 0.986                                | 2.535                             | 100                             | *                             | *                           |
| Seattle           | 0.747                               | 0.747                                | 0.866                             | 99.999980                       | 2.091                         | 3.824                       |
| Washington DC     | 0.775                               | 0.775                                | 1.076                             | 100                             | 2.513                         | 3.962                       |
| Winnipeg          | 0.788                               | 0.790                                | 1.075                             | 100                             | *                             | *                           |

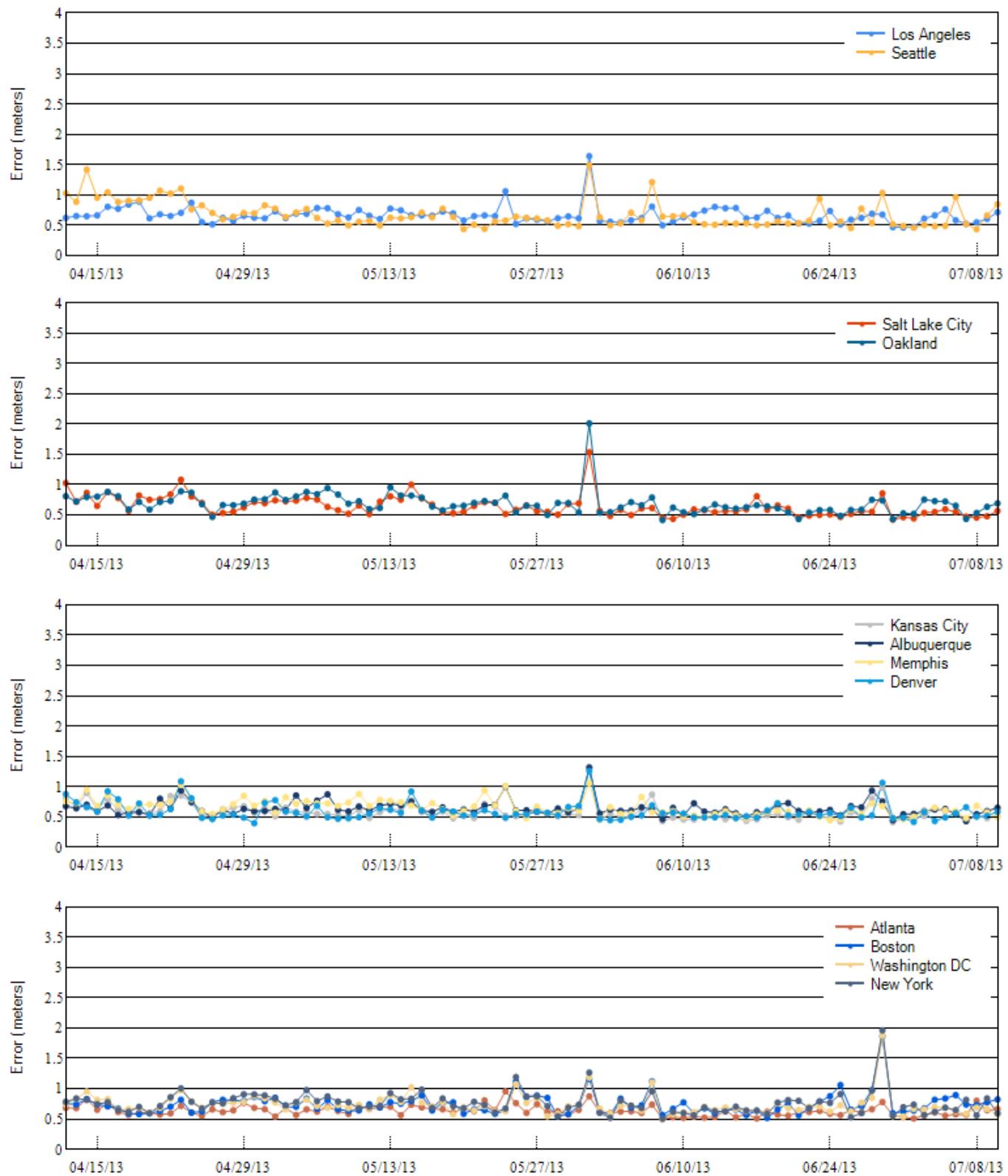
\* = SPS Data not processed.

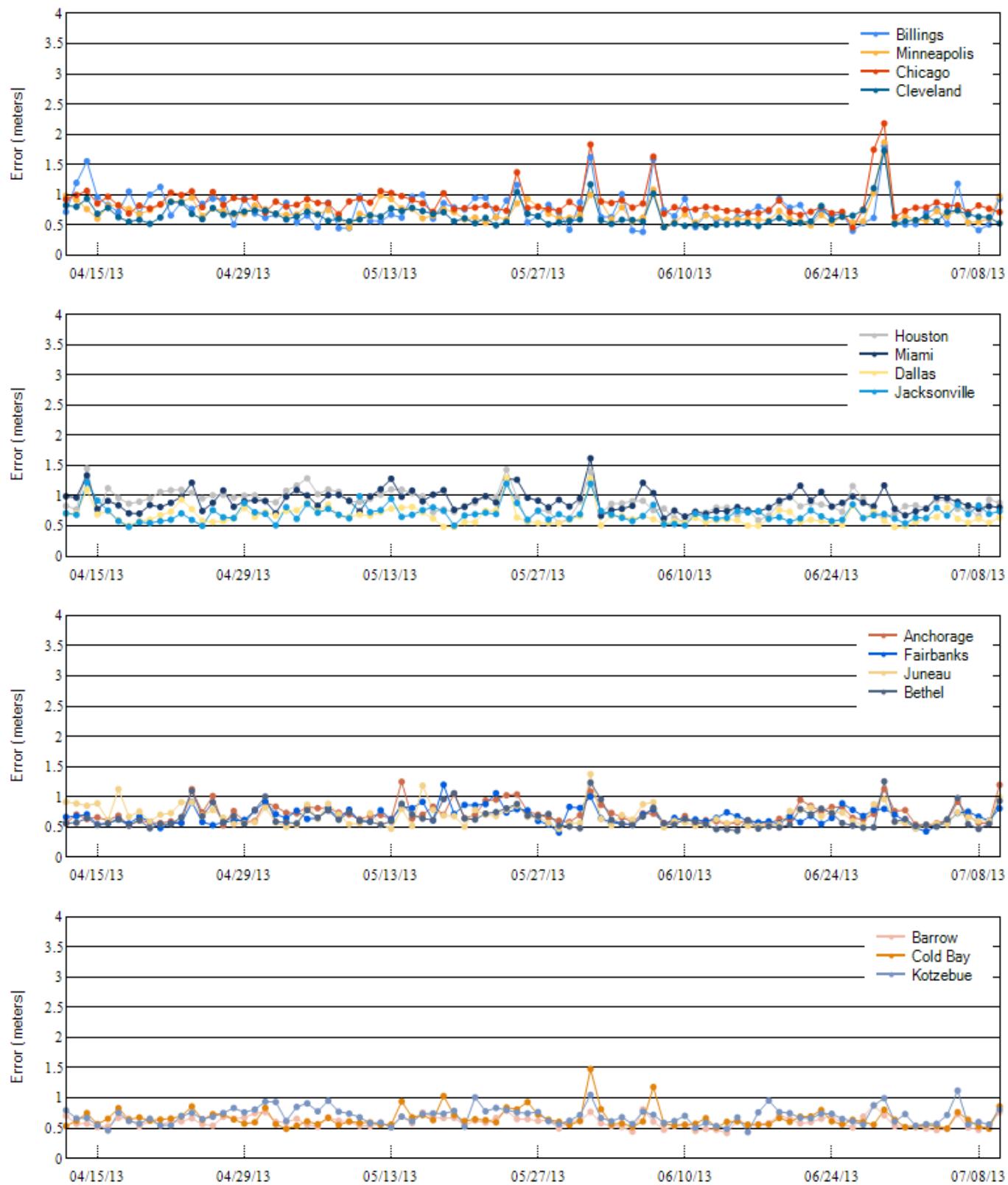
**Table 2-2 NPA 95% and 99.999% Horizontal Accuracy**

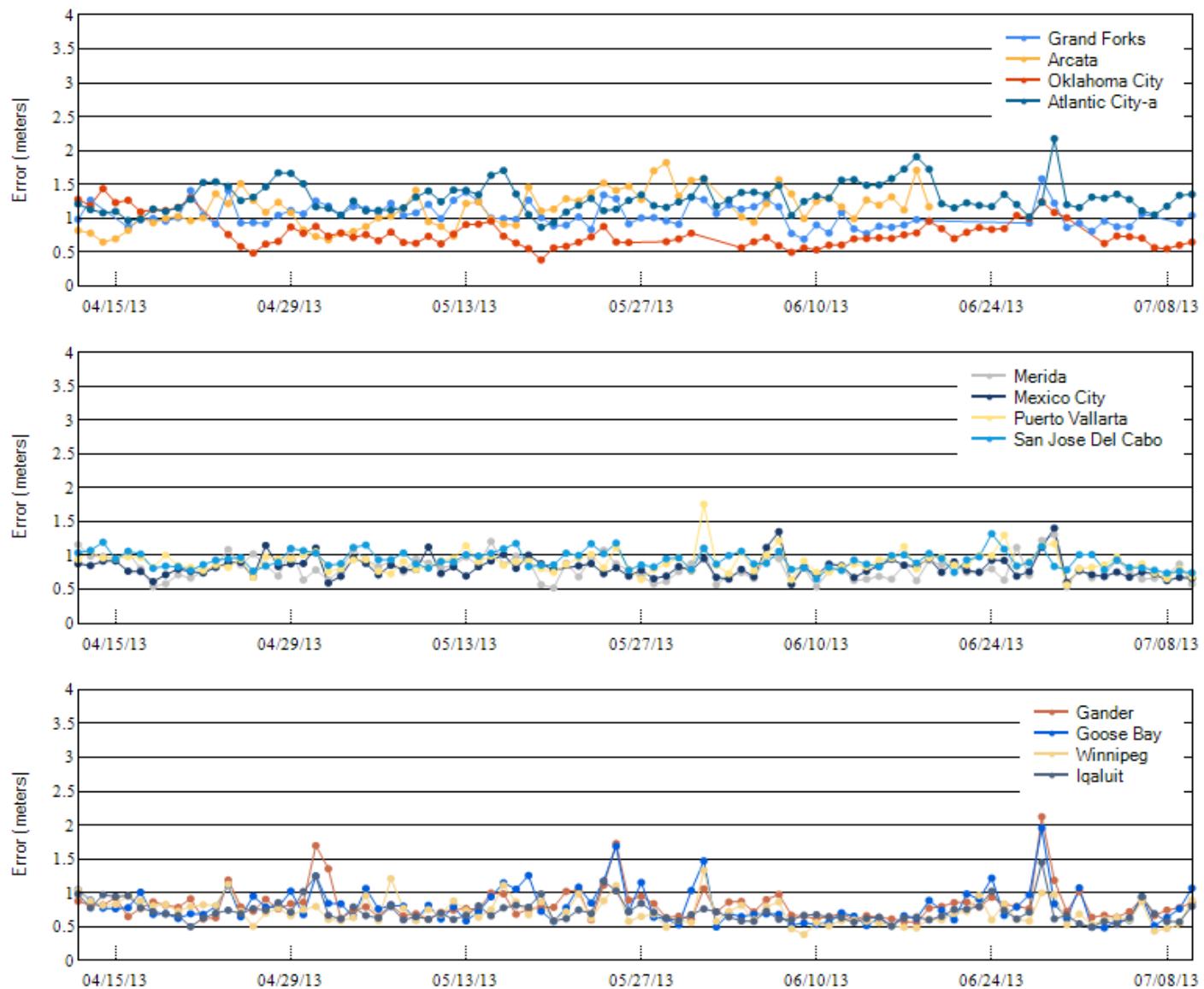
| <b>Location</b>   | <b>95%<br/>Horizontal<br/>(meters)</b> | <b>99.999%<br/>Horizontal<br/>(meters)</b> | <b>Percentage in<br/>NPA mode<br/>(%)</b> | <b>Maximum<br/>Horizontal<br/>Error</b> |
|-------------------|--|--|---|---|
| Albuquerque       | 1.596                                  | 3.882                                      | 100.000                                   | 4.163                                   |
| Anchorage         | 2.747                                  | 4.918                                      | 100.000                                   | 5.061                                   |
| Atlanta           | 1.895                                  | 5.623                                      | 100.000                                   | 5.782                                   |
| Barrow            | 2.360                                  | 5.040                                      | 100.000                                   | 5.397                                   |
| Bethel            | 2.444                                  | 5.509                                      | 100.000                                   | 5.815                                   |
| Billings          | 1.774                                  | 4.744                                      | 100.000                                   | 5.063                                   |
| Boston            | 1.789                                  | 7.701                                      | 100.000                                   | 7.886                                   |
| Cleveland         | 1.490                                  | 6.702                                      | 100.000                                   | 6.899                                   |
| Cold Bay          | 1.750                                  | 6.823                                      | 100.000                                   | 7.097                                   |
| Fairbanks         | 2.928                                  | 5.228                                      | 100.000                                   | 5.477                                   |
| Gander            | 2.020                                  | 6.397                                      | 100.000                                   | 6.591                                   |
| Honolulu          | 5.594                                  | 10.890                                     | 100.000                                   | 11.202                                  |
| Houston           | 2.713                                  | 6.356                                      | 100.000                                   | 6.707                                   |
| Iqaluit           | 2.102                                  | 4.705                                      | 100.000                                   | 4.909                                   |
| Juneau            | 2.425                                  | 4.794                                      | 100.000                                   | 5.237                                   |
| Kansas City       | 1.290                                  | 4.517                                      | 100.000                                   | 4.736                                   |
| Kotzebue          | 2.716                                  | 5.393                                      | 100.000                                   | 5.510                                   |
| Los Angeles       | 2.342                                  | 4.898                                      | 100.000                                   | 5.100                                   |
| Merida            | 3.294                                  | 7.119                                      | 100.000                                   | 7.377                                   |
| Miami             | 3.041                                  | 6.286                                      | 100.000                                   | 6.472                                   |
| Minneapolis       | 1.631                                  | 4.711                                      | 100.000                                   | 4.976                                   |
| Oakland           | 1.822                                  | 5.783                                      | 100.000                                   | 6.036                                   |
| Salt Lake City    | 1.368                                  | 4.531                                      | 100.000                                   | 4.789                                   |
| San Jose Del Cabo | 3.474                                  | 8.826                                      | 100.000                                   | 8.978                                   |
| San Juan          | 2.765                                  | 6.761                                      | 100.000                                   | 7.019                                   |
| Seattle           | 1.424                                  | 5.608                                      | 100.000                                   | 6.101                                   |
| Tapachula         | 3.360                                  | 9.754                                      | 100.000                                   | 9.901                                   |
| Washington DC     | 1.785                                  | 9.289                                      | 100.000                                   | 9.578                                   |

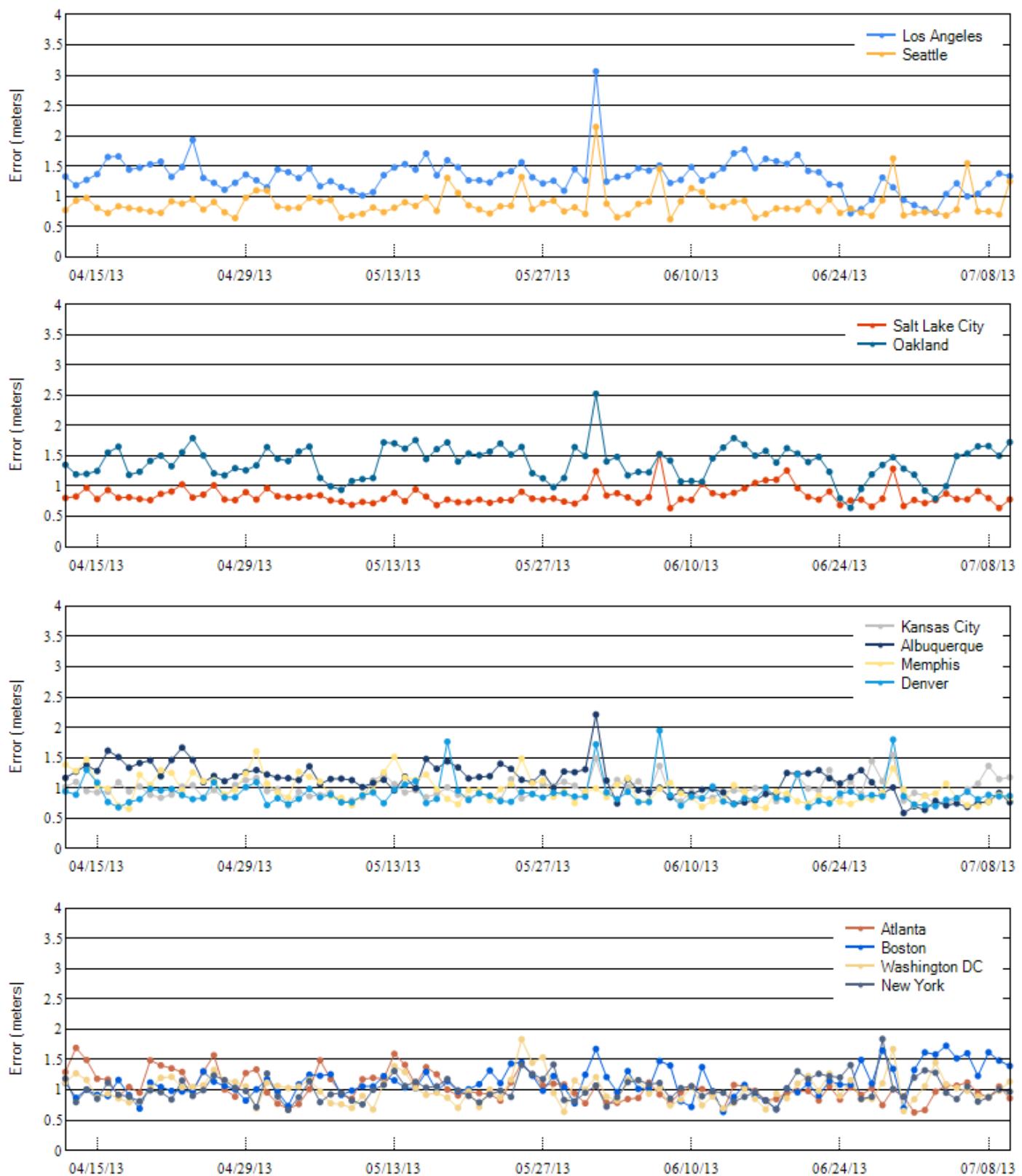
**Table 2-3 Maximum LPV Error Statistics**

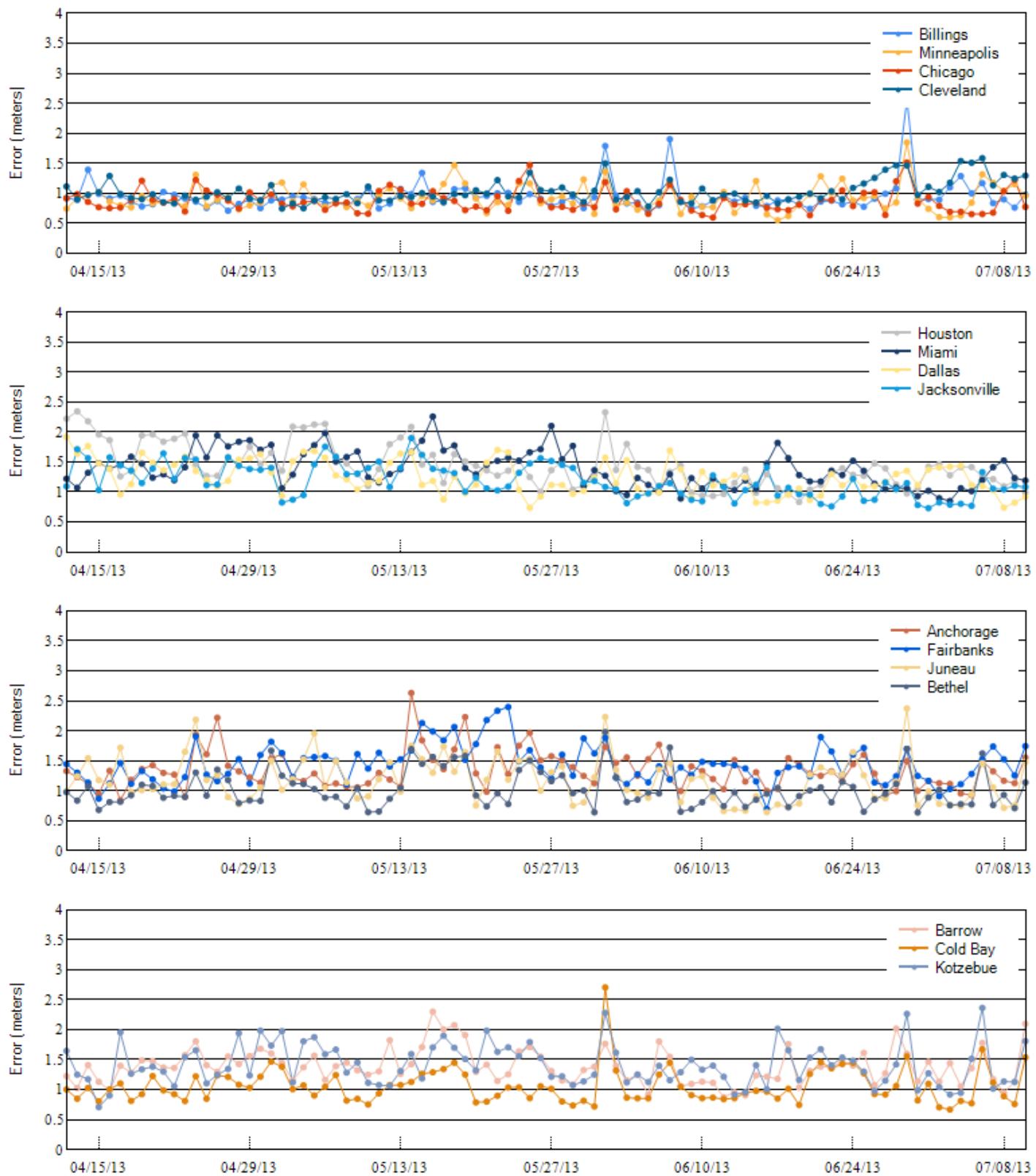
| <b>Location</b>      | <b>Horizontal<br/>Error (m)</b> | <b>Horizontal<br/>Error/HPL</b> | <b>Horizontal<br/>Maximum<br/>Ratio</b> | <b>Vertical<br/>Error<br/>(m)</b> | <b>Vertical<br/>Error/VPL</b> | <b>Vertical<br/>Maximum<br/>Ratio</b> |
|----------------------|---------------------------------|---------------------------------|---|-----------------------------------|-------------------------------|---------------------------------------|
| Arcata               | 3.045                           | 0.214                           | 0.214                                   | 4.442                             | 0.129                         | 0.175                                 |
| Atlantic City        | 3.729                           | 0.207                           | 0.245                                   | 3.952                             | 0.173                         | 0.222                                 |
| Grand Forks          | 2.824                           | 0.170                           | 0.226                                   | 5.381                             | 0.161                         | 0.207                                 |
| Oklahoma City        | 2.021                           | 0.209                           | 0.216                                   | 4.544                             | 0.182                         | 0.209                                 |
| Albuquerque          | 2.375                           | 0.084                           | 0.184                                   | 3.922                             | 0.128                         | 0.177                                 |
| Anchorage            | 2.920                           | 0.113                           | 0.198                                   | 5.326                             | 0.154                         | 0.262                                 |
| Atlanta              | 1.516                           | 0.148                           | 0.148                                   | 2.466                             | 0.164                         | 0.167                                 |
| Barrow               | 2.874                           | 0.183                           | 0.183                                   | 5.790                             | 0.196                         | 0.196                                 |
| Bethel               | 3.279                           | 0.120                           | 0.154                                   | 6.870                             | 0.164                         | 0.164                                 |
| Billings             | 3.188                           | 0.231                           | 0.242                                   | 4.656                             | 0.197                         | 0.197                                 |
| Boston               | 2.881                           | 0.188                           | 0.196                                   | 3.580                             | 0.155                         | 0.182                                 |
| Chicago              | 3.491                           | 0.137                           | 0.266                                   | 4.100                             | 0.111                         | 0.178                                 |
| Cleveland            | 2.450                           | 0.147                           | 0.203                                   | 3.236                             | 0.209                         | 0.209                                 |
| Cold Bay             | 3.372                           | 0.104                           | 0.111                                   | 5.153                             | 0.104                         | 0.134                                 |
| Dallas               | 2.136                           | 0.130                           | 0.203                                   | 3.474                             | 0.126                         | 0.226                                 |
| Denver               | 2.216                           | 0.145                           | 0.172                                   | 4.359                             | 0.158                         | 0.172                                 |
| Fairbanks            | 3.042                           | 0.241                           | 0.241                                   | 5.384                             | 0.240                         | 0.240                                 |
| Gander               | 3.743                           | 0.119                           | 0.168                                   | 5.135                             | 0.129                         | 0.147                                 |
| Goose Bay            | 3.411                           | 0.095                           | 0.166                                   | 6.627                             | 0.189                         | 0.189                                 |
| Houston              | 2.251                           | 0.202                           | 0.234                                   | 4.418                             | 0.157                         | 0.232                                 |
| Iqaluit              | 2.380                           | 0.114                           | 0.146                                   | 5.192                             | 0.107                         | 0.164                                 |
| Jacksonville         | 1.786                           | 0.127                           | 0.169                                   | 3.778                             | 0.239                         | 0.239                                 |
| Juneau               | 2.669                           | 0.085                           | 0.165                                   | 4.867                             | 0.211                         | 0.211                                 |
| Kansas City          | 2.154                           | 0.188                           | 0.190                                   | 2.965                             | 0.175                         | 0.185                                 |
| Kotzebue             | 2.969                           | 0.096                           | 0.195                                   | 6.974                             | 0.147                         | 0.181                                 |
| Los Angeles          | 2.457                           | 0.093                           | 0.164                                   | 4.703                             | 0.131                         | 0.192                                 |
| Memphis              | 1.700                           | 0.165                           | 0.172                                   | 2.923                             | 0.224                         | 0.224                                 |
| Merida               | 2.739                           | 0.106                           | 0.163                                   | 4.005                             | 0.162                         | 0.168                                 |
| Mexico City          | 3.447                           | 0.198                           | 0.198                                   | 8.279                             | 0.207                         | 0.209                                 |
| Miami                | 2.129                           | 0.144                           | 0.188                                   | 3.419                             | 0.109                         | 0.183                                 |
| Minneapolis          | 3.981                           | 0.102                           | 0.212                                   | 3.572                             | 0.085                         | 0.169                                 |
| New York             | 2.863                           | 0.169                           | 0.202                                   | 3.572                             | 0.184                         | 0.184                                 |
| Oakland              | 3.138                           | 0.205                           | 0.205                                   | 4.260                             | 0.126                         | 0.162                                 |
| Puerto Vallarta      | 3.355                           | 0.112                           | 0.182                                   | 7.433                             | 0.155                         | 0.230                                 |
| Salt Lake City       | 2.483                           | 0.137                           | 0.194                                   | 3.476                             | 0.129                         | 0.157                                 |
| San Jose Del<br>Cabo | 2.097                           | 0.125                           | 0.148                                   | 6.955                             | 0.199                         | 0.261                                 |
| San Juan             | 3.179                           | 0.085                           | 0.097                                   | 5.962                             | 0.129                         | 0.129                                 |
| Seattle              | 2.860                           | 0.127                           | 0.176                                   | 6.796                             | 0.269                         | 0.269                                 |
| Washington DC        | 2.830                           | 0.167                           | 0.188                                   | 2.930                             | 0.176                         | 0.187                                 |
| Winnipeg             | 3.048                           | 0.173                           | 0.178                                   | 5.594                             | 0.197                         | 0.197                                 |

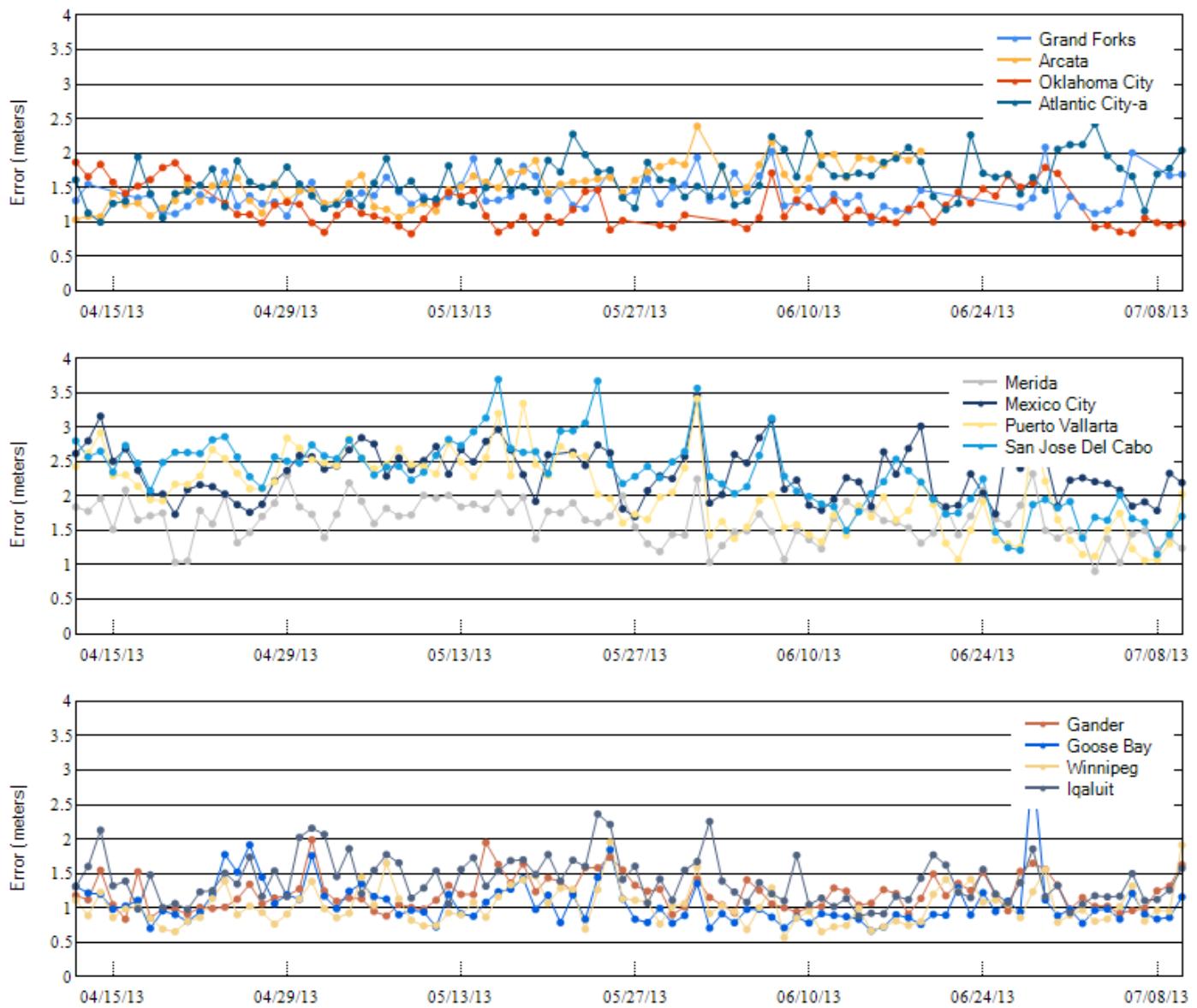
**Figure 2-1 LPV 95% Horizontal Accuracy**

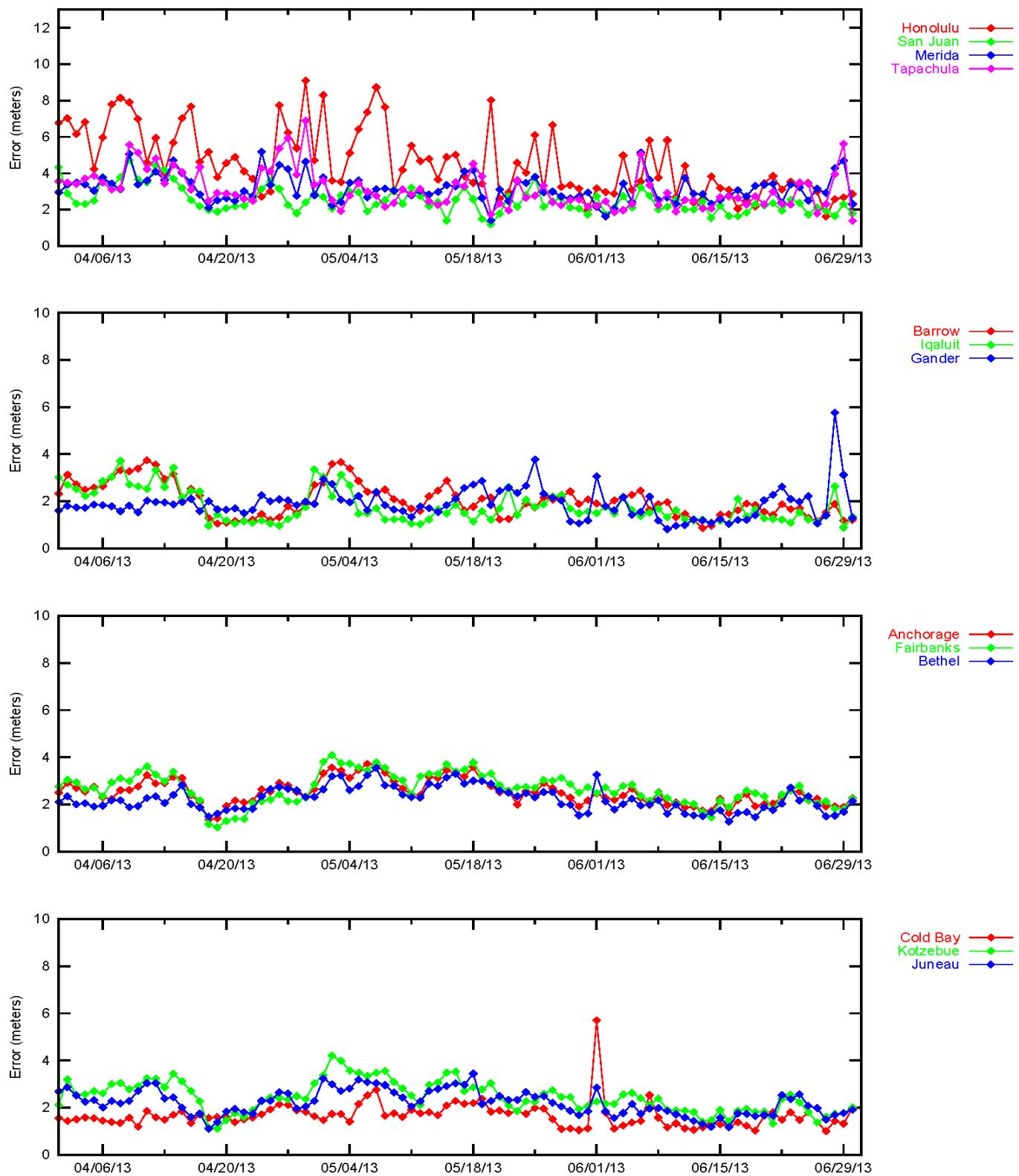
**Figure 2-2 LPV 95% Horizontal Accuracy**

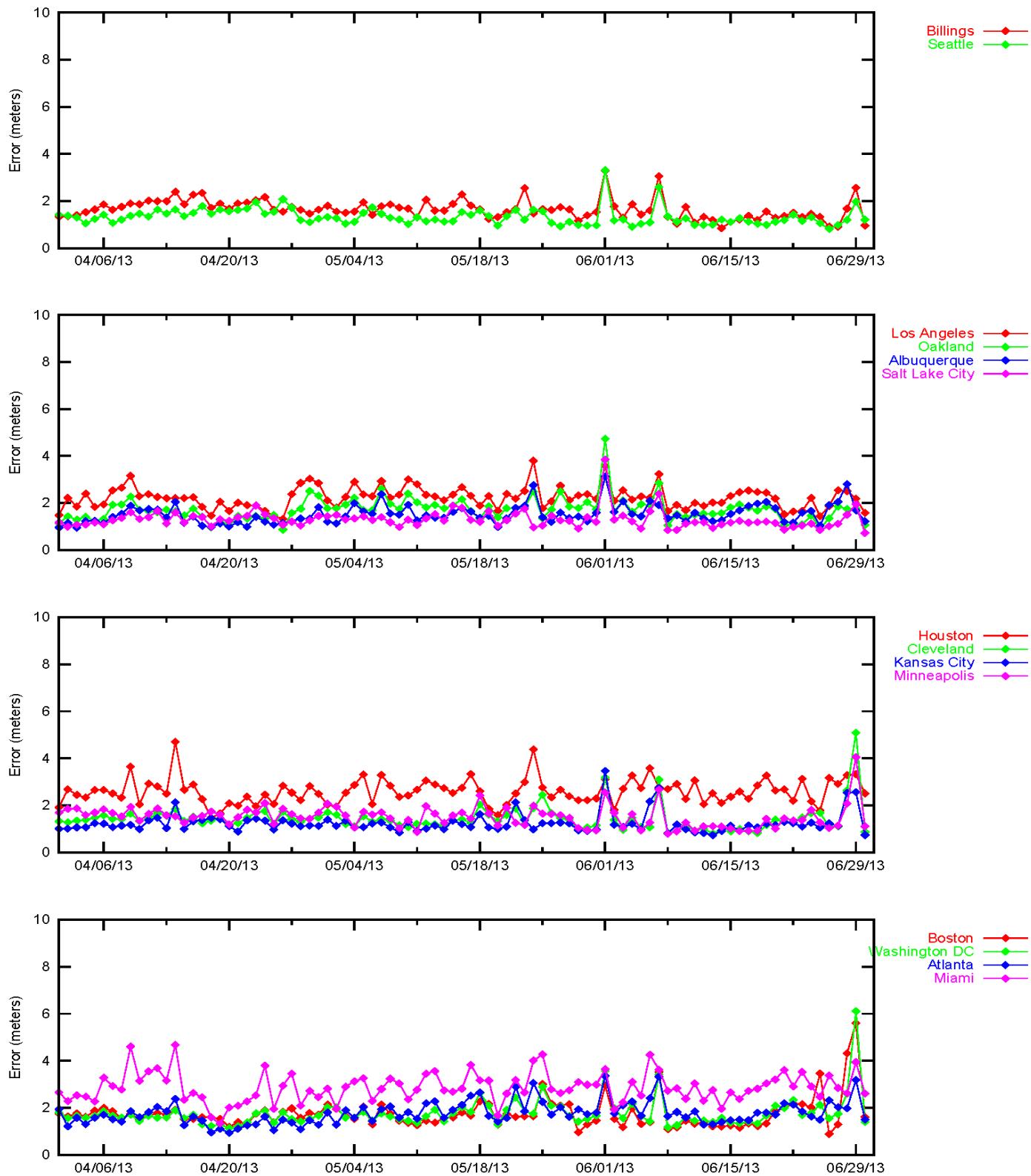
**Figure 2-3 LPV 95% Horizontal Accuracy**

**Figure 2-4 LPV 95% Vertical Accuracy**

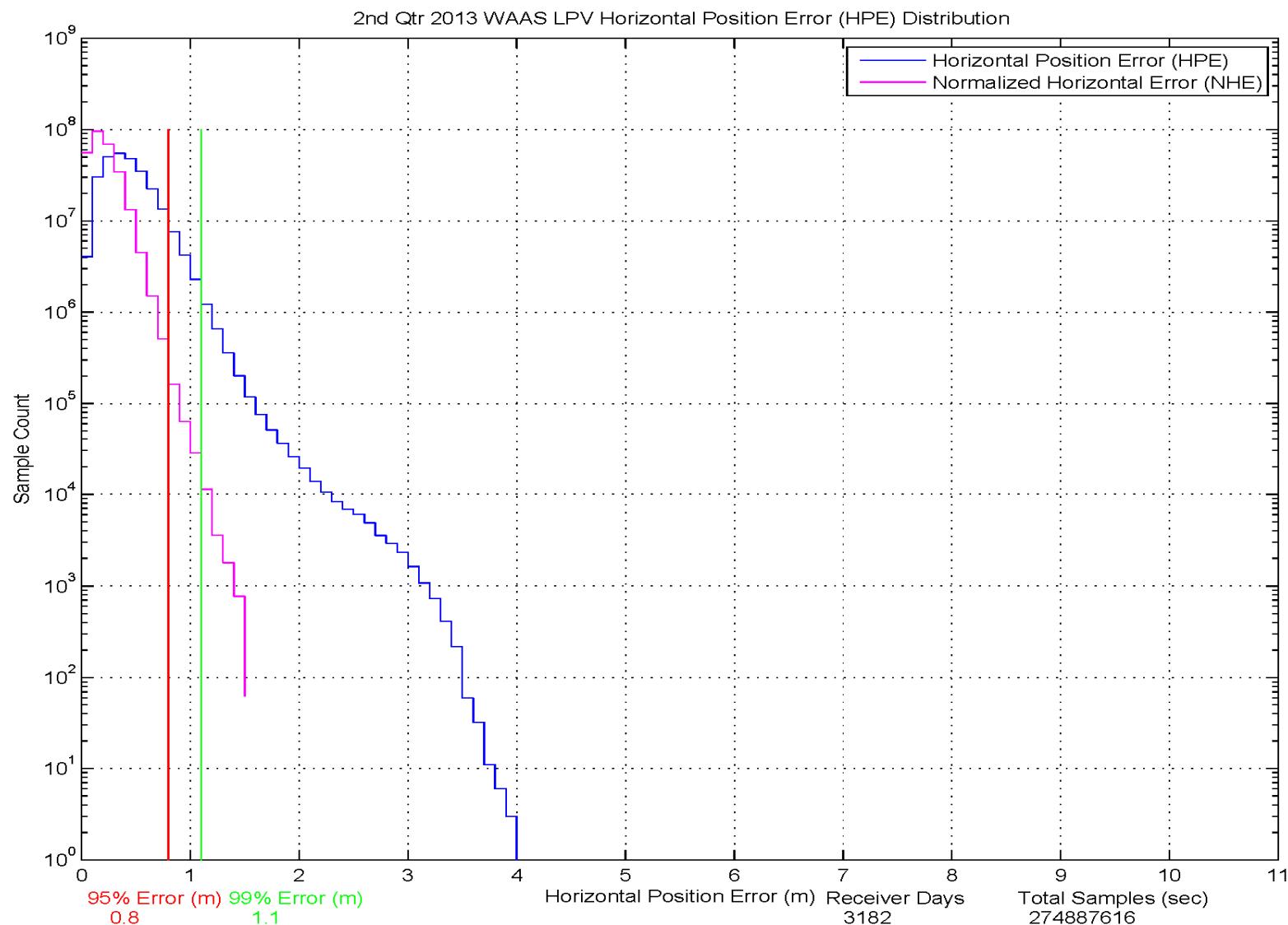
**Figure 2-5 LPV 95% Vertical Accuracy**

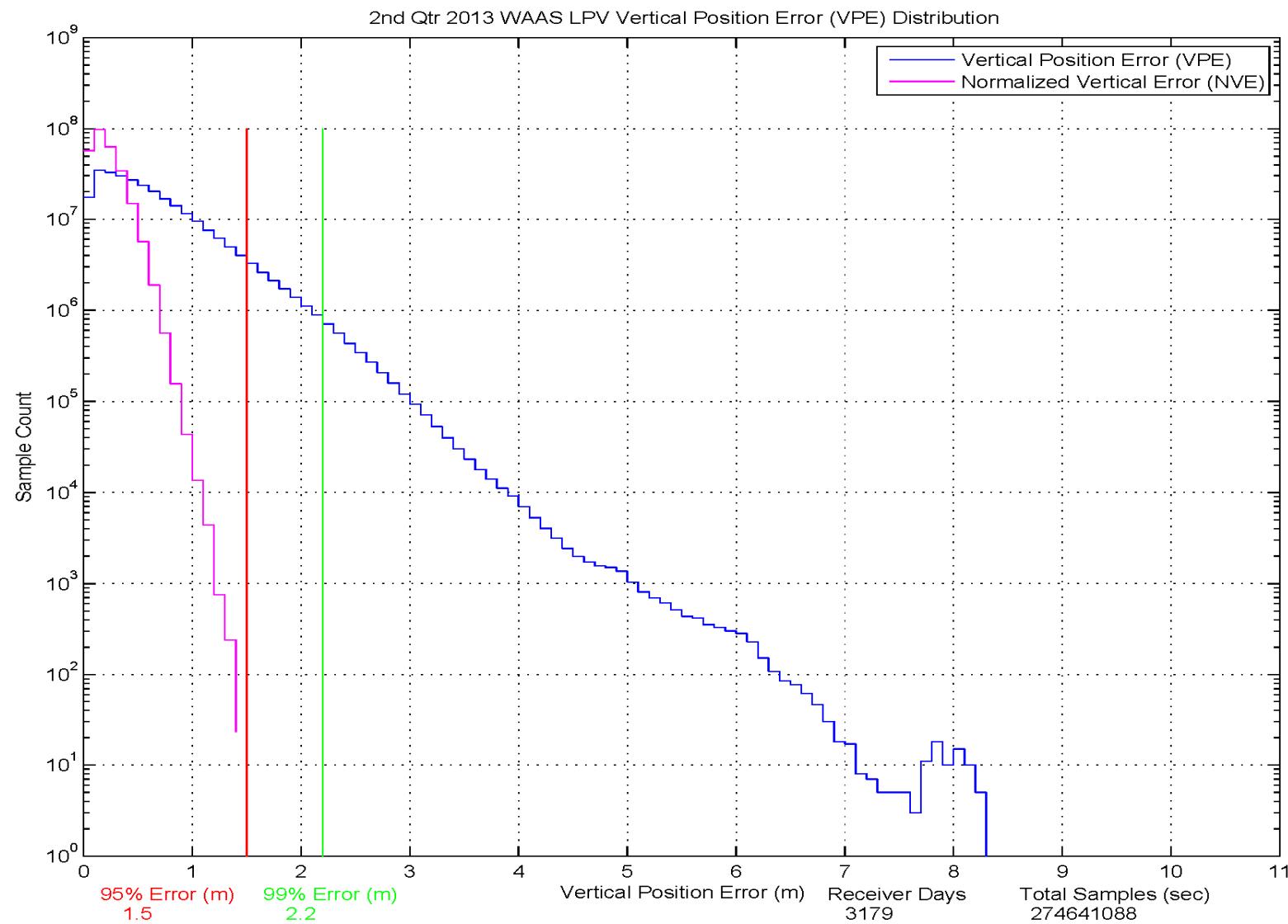
**Figure 2-6 LPV 95% Vertical Accuracy**

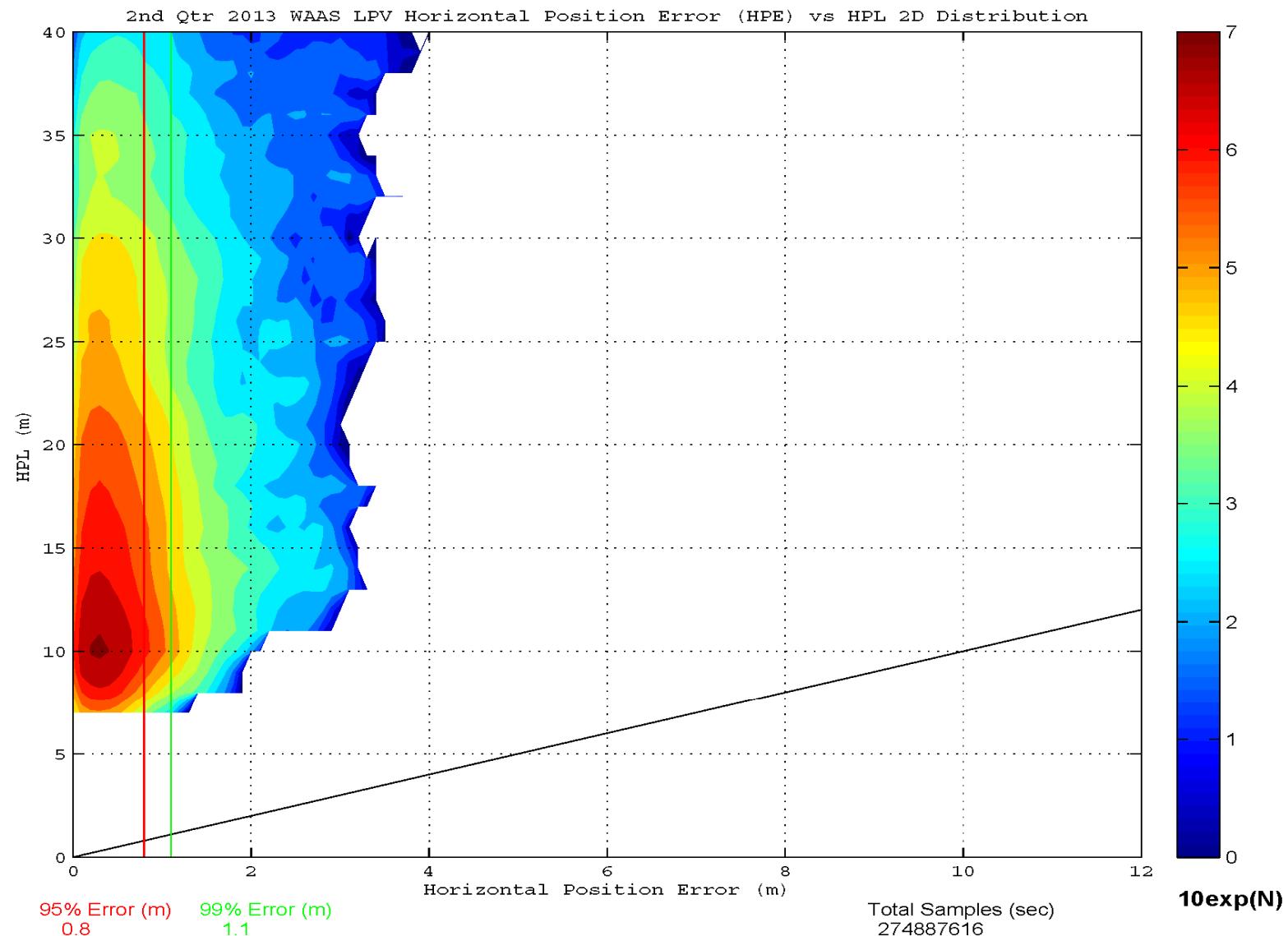
**Figure 2-7 NPA 95% Horizontal Accuracy**

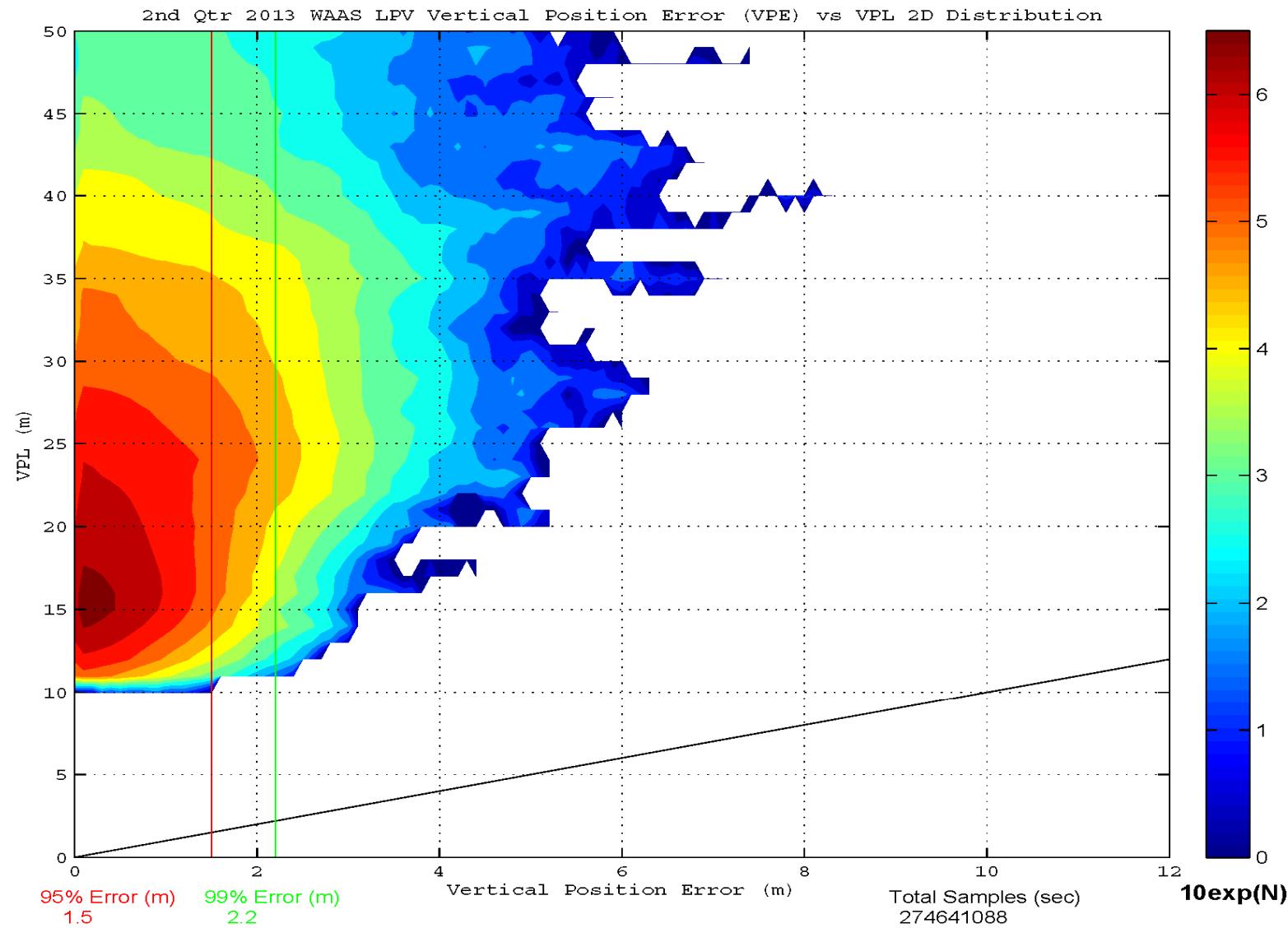
**Figure 2-8 NPA 95% Horizontal Accuracy**

**Figure 2-9 LPV Horizontal Error Bounding Triangle Chart**



**Figure 2-10 LPV Vertical Error Bounding Triangle Chart**

**Figure 2-11 LPV 2-D Horizontal Error Distribution Histogram**

**Figure 2-12 LPV 2-D Vertical Error Distribution Histogram**

### 3.0 AVAILABILITY

The WAAS availability evaluation documents the percentage of time that the WAAS provided service for the operational service levels defined in Table 1-1. RTCA DO-229D Vertical and Horizontal Protection Levels were computed for each receiver being evaluated. Table 3-1 shows the protection levels that were maintained for 99% of the time for each receiver location for the quarter. The table also included the percentage in PA mode as described in section 2.0.

For this reporting period, the maximum 99% CONUS HPL and VPL are 19.663 meters at Miami and 35.743 meters, at Arcata, respectively. The minimum 99% CONUS HPL and VPL are 10.766 meters at Memphis and 17.976 meters at Chicago, respectively. The maximum 99% Alaska HPL and VPL are 28.434 meters and 37.722 meters, both at Cold Bay, respectively. The minimum 99% Alaska HPL and VPL are 13.577 meters at Fairbanks and 22.413 meters at Juneau, respectively.

Availability of LP, LPV and LPV 200 service are evaluated by monitoring the WAAS protection levels at receiver locations throughout the test period. If both the vertical and horizontal protection levels are not greater than their respective alert limits (VAL and HAL) then the service is available. If either of the protection levels exceeds the required alert limit then the operational service at that location is considered unavailable and an outage in service is recorded with its duration. The operational service is not considered available again until the protection levels are both within the alert limits for at least 15 minutes. Although this will reduce operational service availability minimally, it substantially reduces the number of service outages and prevents excessive switching in and out of service availability. The percent of time that LP, LPV, and LPV 200 service is available using the fifteen-minute window criteria is presented in Table 3-2. The LP, LPV, and LPV 200 service outages and associated outage rate for the reporting period is presented in Table 3-4. The outage rate is the percent of approaches that theoretically would be interrupted by a loss of operational service once the approach had started. Figures 3-1 to 3-6 show the daily availability of LPV and LPV 200 service levels. Figures 3-7 to 3-12 show the daily interruptions of LPV and LPV 200 service levels for the evaluation period.

Availability of NPA service is evaluated by monitoring the WAAS horizontal protection level at receiver locations throughout the test period. If the horizontal protection level is not greater than the horizontal alert limit (HAL = 556m) then the service is available. If the horizontal protection level exceeds the required alert level or if WAAS navigation message is not received then the NPA service at that location is considered unavailable and an outage in service is recorded with its duration. The NPA service is not considered available again until the horizontal protection level is within the alert limit for at least 15 minutes. The percent of time that NPA service is available using the fifteen-minute window criteria is presented in Table 3-3. The NPA service outages and associated outage rate for this period is presented in Table 3-5. The outage rate is the percent of NPA approaches that theoretically would be interrupted by a loss of operational service once the approach had started.

Low PA and NPA availability for this reporting period are mostly due to GPS satellite outages, carrier phase anomalies, GUS switchovers, geomagnetic activity, and elevated GIVE and UDRE values. Please refer to Table 1-5 for all the events that affected availability.

Increase in WAAS availability was observed after June 22<sup>nd</sup> when PRN-27 was added to GPS satellite constellation.

Manual GUS switchover on CRE GEO (PRN-138) on April 12<sup>th</sup> and May 30<sup>th</sup> elevated UDRE values and caused minor reduction in Canada availability. Manual GUS switchover on CRW GEO (PRN-135) on June 2<sup>nd</sup> elevated UDRE values and reduced availability in CONUS, Alaska and Canada. Faulted GUS switchover on CRW GEO (PRN-135) on Jun 12<sup>th</sup> elevated UDRE values and reduced availability in CONUS, Alaska and Canada. GUS hardware failure of PNE CRE GEO (PRN-138) on May 15<sup>th</sup> caused missed navigation messages and two seconds service outage in CONUS, Alaska and Canada. [See DR 114 “LPV Service Outage Due to Consecutive SV Alerts on PRN 138”](#) for a more detailed description.

A brief carrier phase anomaly on PRN-21 on May 30<sup>th</sup> and June 8<sup>th</sup> caused WAAS to issue a SV alert setting PRN-21 to “Not Monitored” resulted in a minor reduction in LPV-200 CONUS availability; the carrier phase anomaly on June 8<sup>th</sup> also reduced Mexico availability. A brief carrier phase anomaly on PRN-32 on June 24<sup>th</sup> caused WAAS to issue a SV alert setting PRN-32 to “Not Monitored” resulted in a minor reduction in LPV-200 Alaska and Canada

availability.

Geomagnetic activity on April 24<sup>th</sup> elevated GIVE values and slightly reduced CONUS, Alaska, Canada and Mexico availability. Geomagnetic activity on May 1<sup>st</sup> and May 16-19<sup>th</sup> caused minor availability drop at Alaska and Canada. Geomagnetic activity on June 1<sup>st</sup> significantly reduced CONUS, Alaska, Canada, and Mexico availability. [See DR 115 “Effect on WAAS from Iono Activity on 01June2013”](#) for a more detailed description

Planned maintenance on PRN-18 on April 4<sup>th</sup> affected CONUS, Alaska and Canada availability. Planned maintenance on PRN-8 on April 11<sup>th</sup> reduced CONUS and Mexico availability. Planned maintenance on PRN-25 on May 10-11<sup>th</sup> affected CONUS, Alaska and Canada availability.

Intermittent communication outages at Iqaluit on May 10<sup>th</sup> increased GIVE values at northern latitudes due to the loss of data from Iqaluit reference stations and resulted in minor availability reduction in Northern Canada. Communication outages at Cold Bay, Bethel and Juneau on June 14<sup>th</sup> increased GIVE values and caused slight availability reduction in Alaska.

Radio frequency interference (RFI) caused localized loss of LPV/LPV200 availability at Boston on April 2<sup>nd</sup>, June 10<sup>th</sup>, and June 21<sup>st</sup>, at Salt Lake City on April 13<sup>th</sup>, at Los Angeles on May 13<sup>th</sup>, and at Miami on May 23<sup>rd</sup>, but had no effect on WAAS service.

**Table 3-1 99% Protection Level**

| <b>Location</b>   | <b>99% HPL<br/>(meters)</b> | <b>99% VPL<br/>(meters)</b> | <b>Percentage in PA mode</b> |
|-------------------|-----------------------------|-----------------------------|------------------------------|
| Arcata            | 16.031                      | 33.293                      | 100                          |
| Atlantic City     | 14.154                      | 22.657                      | 100                          |
| Grand Forks       | 15.120                      | 28.441                      | 100                          |
| Oklahoma City     | 12.822                      | 23.815                      | 100                          |
| Albuquerque       | 12.854                      | 26.336                      | 100                          |
| Anchorage         | 15.446                      | 25.424                      | 100                          |
| Atlanta           | 12.096                      | 19.445                      | 100                          |
| Barrow            | 19.180                      | 37.658                      | 99.999910                    |
| Bethel            | 18.467                      | 31.064                      | 100                          |
| Billings          | 14.058                      | 23.408                      | 99.999980                    |
| Boston            | 15.810                      | 23.423                      | 100                          |
| Chicago           | 12.400                      | 20.641                      | 100                          |
| Cleveland         | 14.360                      | 21.867                      | 100                          |
| Cold Bay          | 28.785                      | 40.103                      | 100                          |
| Dallas            | 13.495                      | 22.906                      | 100                          |
| Denver            | 12.626                      | 29.209                      | 100                          |
| Fairbanks         | 15.111                      | 26.372                      | 100                          |
| Gander            | 27.799                      | 40.786                      | 100                          |
| Goose Bay         | 22.688                      | 30.734                      | 100                          |
| Houston           | 12.454                      | 23.547                      | 100                          |
| Iqaluit           | 29.712                      | 44.727                      | 100                          |
| Jacksonville      | 13.795                      | 21.252                      | 100                          |
| Juneau            | 15.977                      | 24.387                      | 100                          |
| Kansas City       | 12.000                      | 19.600                      | 100                          |
| Kotzebue          | 17.371                      | 34.838                      | 99.999910                    |
| Los Angeles       | 15.699                      | 28.374                      | 99.999980                    |
| Memphis           | 11.521                      | 19.086                      | 100                          |
| Merida            | 19.403                      | 33.045                      | 100                          |
| Mexico City       | 32.302                      | 40.552                      | 99.999970                    |
| Miami             | 17.545                      | 25.091                      | 100                          |
| Minneapolis       | 12.559                      | 21.443                      | 100                          |
| New York          | 14.857                      | 23.054                      | 100                          |
| Oakland           | 17.497                      | 32.207                      | 99.999980                    |
| Puerto Vallarta   | 35.155                      | 53.200                      | 100                          |
| Salt Lake City    | 13.659                      | 21.914                      | 99.999980                    |
| San Jose Del Cabo | 28.562                      | 39.735                      | 100                          |
| Seattle           | 14.323                      | 23.817                      | 99.999980                    |
| Washington DC     | 13.419                      | 21.166                      | 100                          |
| Winnipeg          | 16.121                      | 26.388                      | 100                          |

**Table 3-2 Quarterly Availability Statistics**

| <b>Location</b>   | <b>LP WAAS<br/>With 15 minute<br/>window</b> | <b>LPV<br/>WAAS<br/>With 15 minute<br/>window</b> | <b>LPV 200<br/>WAAS<br/>With 15 minute<br/>window</b> |
|-------------------|--|---|---|
| Arcata            | 1  | 1   | 0.991884  |
| Atlantic City     | 0.999814                                     | 0.999814  | 0.999083  |
| Grand Forks       | 0.999359                                     | 0.999068  | 0.998476  |
| Oklahoma City     | 1  | 1   | 0.999994  |
| Albuquerque       | 1  | 1   | 0.999551  |
| Anchorage         | 0.999363                                     | 0.999181  | 0.998394  |
| Atlanta           | 1  | 1   | 1   |
| Barrow            | 0.999912                                     | 0.999272  | 0.972899  |
| Bethel            | 0.999249                                     | 0.998821  | 0.997343  |
| Billings          | 1  | 0.999363  | 0.998613  |
| Boston            | 0.999993                                     | 0.999993  | 0.999963  |
| Chicago           | 1  | 1   | 0.999845  |
| Cleveland         | 1  | 1   | 1   |
| Cold Bay          | 0.998964                                     | 0.998145  | 0.931923  |
| Dallas            | 1  | 1   | 1   |
| Denver            | 1  | 1   | 0.99978   |
| Fairbanks         | 0.999901                                     | 0.999232  | 0.998702  |
| Gander            | 0.999759                                     | 0.999064  | 0.90275   |
| Goose Bay         | 0.999589                                     | 0.99955   | 0.998524  |
| Honolulu          | 0  | 0   | 0   |
| Houston           | 1  | 1   | 0.999665  |
| Iqaluit           | 0.998864                                     | 0.996072  | 0.912316  |
| Jacksonville      | 1  | 1   | 1   |
| Juneau            | 0.999589                                     | 0.99896   | 0.998172  |
| Kansas City       | 1  | 1   | 1   |
| Kotzebue          | 0.999391                                     | 0.998873  | 0.988315  |
| Los Angeles       | 1  | 1   | 0.999046  |
| Memphis           | 1  | 1   | 1   |
| Merida            | 0.999175                                     | 0.996489  | 0.993623  |
| Mexico City       | 0.998035                                     | 0.995052  | 0.935867  |
| Miami             | 0.999999                                     | 0.999991  | 0.999711  |
| Minneapolis       | 0.999566                                     | 0.999351  | 0.999176  |
| New York          | 1  | 1   | 1   |
| Oakland           | 1  | 1   | 0.991813  |
| Puerto Vallarta   | 0.997388                                     | 0.978178  | 0.898652  |
| Salt Lake City    | 0.999992                                     | 0.999992  | 0.99997   |
| San Jose Del Cabo | 0.997871                                     | 0.9947  | 0.929756  |
| Seattle           | 1  | 0.99987   | 0.998533  |
| Washington DC     | 1  | 1   | 1   |
| Winnipeg          | 0.999429                                     | 0.999155  | 0.998652  |

**Table 3-3 NPA Availability**

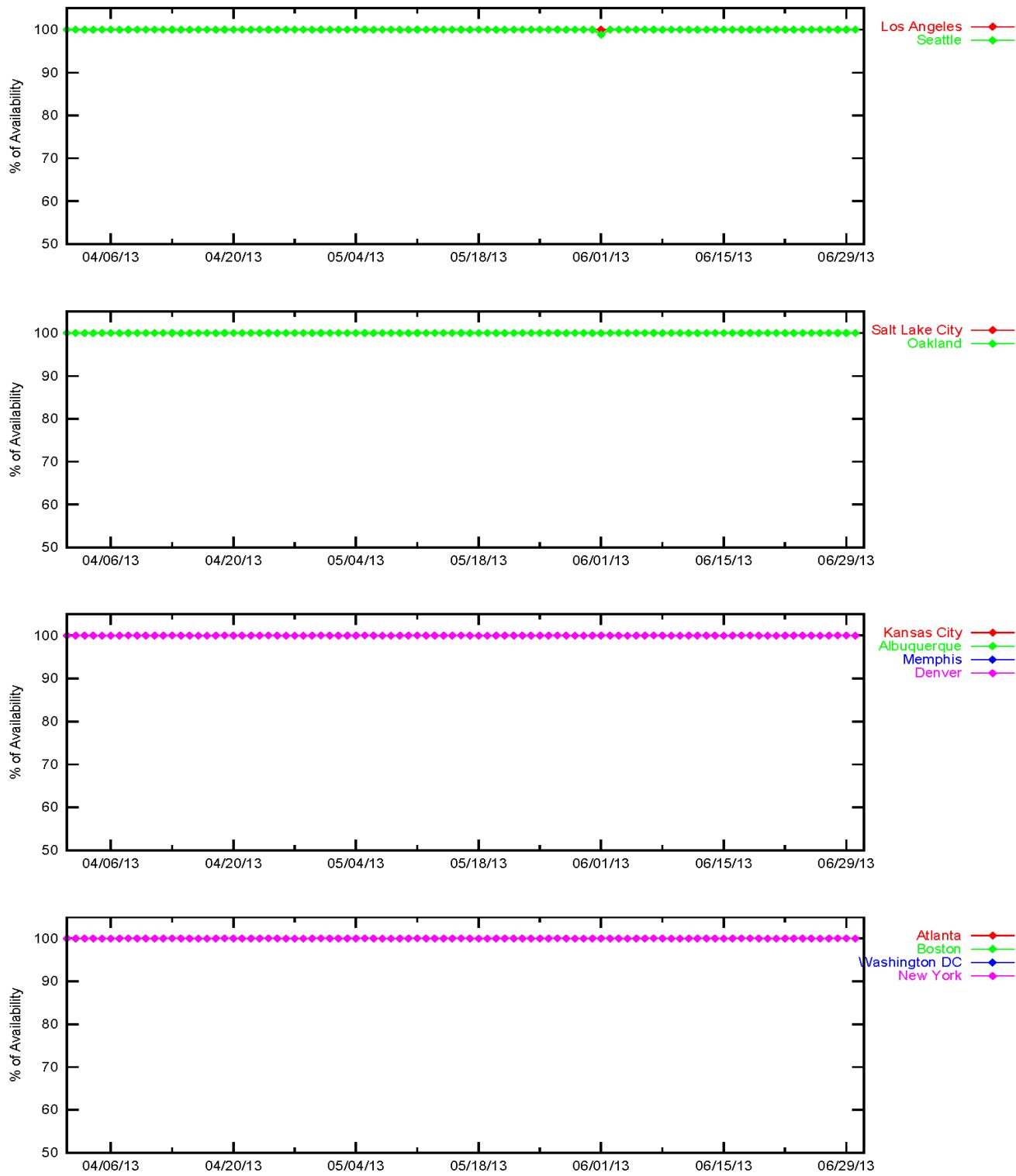
| <b>Location</b>   | <b>NPA Availability<br/>(Excluding RAIM/FDE)</b> |
|-------------------|--|
| Albuquerque       | 1  |
| Anchorage         | 1  |
| Atlanta           | 1  |
| Barrow            | 1  |
| Bethel            | 1  |
| Billings          | 1  |
| Boston            | 1  |
| Cleveland         | 1  |
| Cold Bay          | 1  |
| Fairbanks         | 1  |
| Gander            | 1  |
| Honolulu          | 1  |
| Houston           | 1  |
| Iqaluit           | 1  |
| Juneau            | 1  |
| Kansas City       | 1  |
| Kotzebue          | 1  |
| Los Angeles       | 1  |
| Merida            | 1  |
| Miami             | 1  |
| Minneapolis       | 1  |
| Oakland           | 1  |
| Salt Lake City    | 1  |
| San Jose Del Cabo | 1  |
| San Juan          | 1  |
| Seattle           | 1  |
| Tapachula         | 1  |
| Washington DC     | 1  |

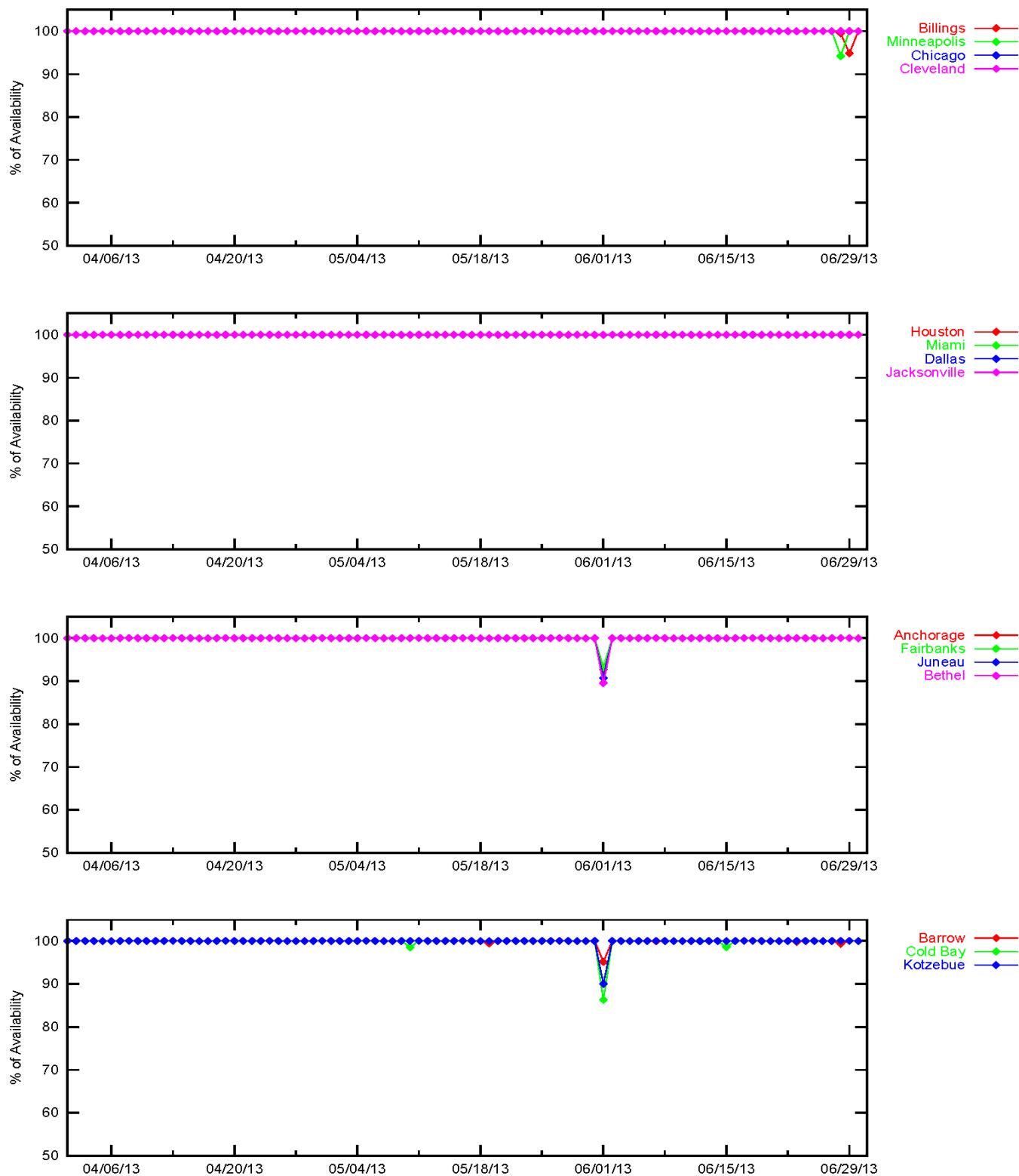
**Table 3-4 LPV and LPV 200 Outage Rate (Per 150 sec approach)**

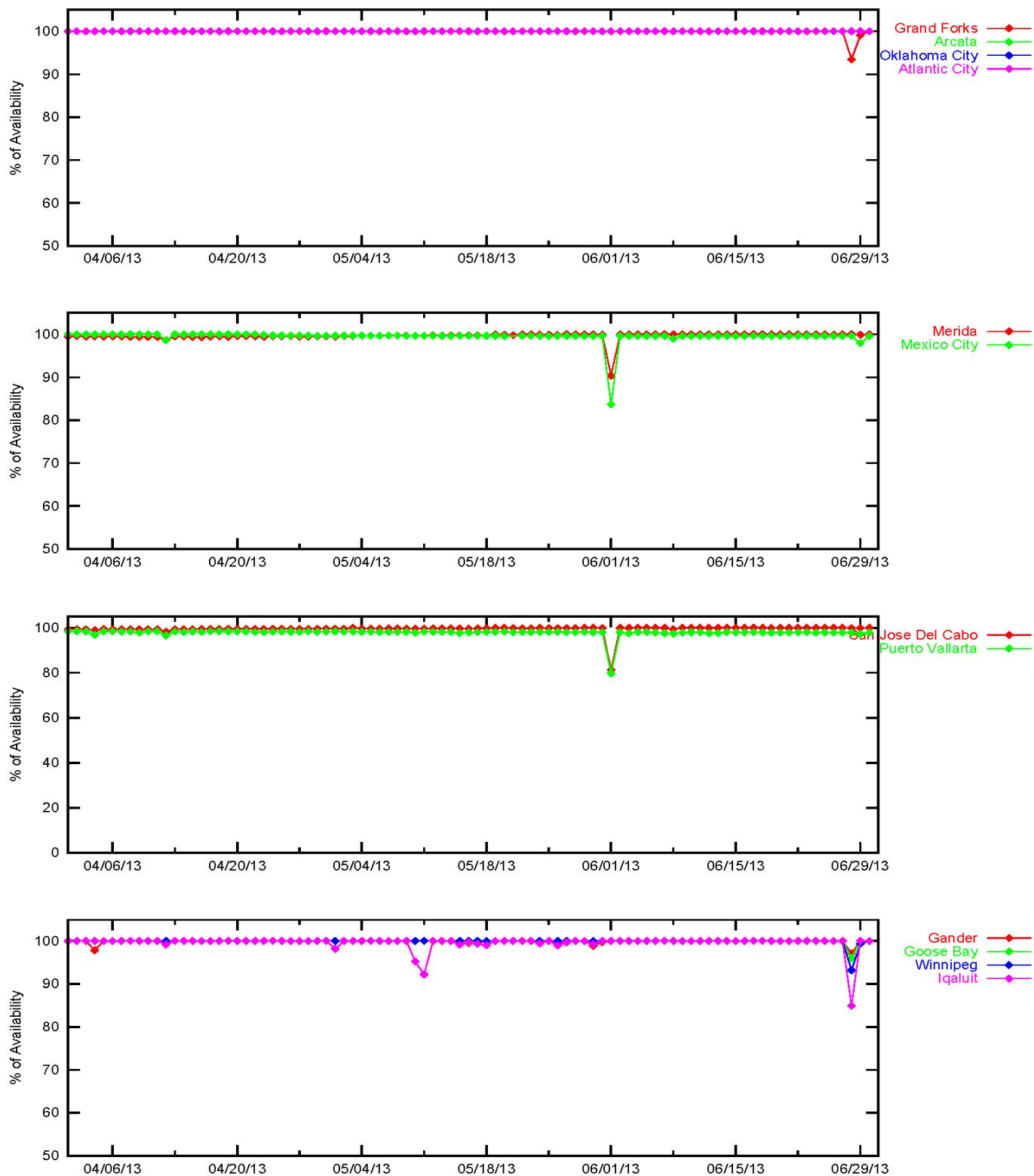
| <b>Location</b>   | <b>LP<br/>Outages</b> | <b>LP<br/>Outage<br/>Rates</b> | <b>LPV<br/>Outages</b> | <b>LPV<br/>Outage<br/>Rates</b> | <b>LPV 200<br/>Outages</b> | <b>LPV 200<br/>Outage<br/>Rates</b> |
|-------------------|-----------------------|--------------------------------|------------------------|---------------------------------|----------------------------|-------------------------------------|
| Arcata            | 1                     | 0.000023                       | 1                      | 0.000023                        | 97                         | 0.002248                            |
| Atlantic City     | 22                    | 0.000148                       | 22                     | 0.000148                        | 48                         | 0.000323                            |
| Grand Forks       | 2                     | 0.000044                       | 2                      | 0.000044                        | 11                         | 0.000240                            |
| Oklahoma City     | 0                     | 0                              | 0                      | 0                               | 1                          | 0.000021                            |
| Albuquerque       | 1                     | 0.000020                       | 1                      | 0.000020                        | 3                          | 0.000059                            |
| Anchorage         | 2                     | 0.000039                       | 3                      | 0.000059                        | 3                          | 0.000059                            |
| Atlanta           | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Barrow            | 6                     | 0.000117                       | 12                     | 0.000234                        | 222                        | 0.004452                            |
| Bethel            | 2                     | 0.000039                       | 3                      | 0.000059                        | 15                         | 0.000293                            |
| Billings          | 1                     | 0.000020                       | 3                      | 0.000059                        | 6                          | 0.000117                            |
| Boston            | 1                     | 0.000020                       | 1                      | 0.000020                        | 5                          | 0.000098                            |
| Chicago           | 0                     | 0                              | 0                      | 0                               | 1                          | 0.000020                            |
| Cleveland         | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Cold Bay          | 2                     | 0.000039                       | 6                      | 0.000117                        | 519                        | 0.010873                            |
| Dallas            | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Denver            | 0                     | 0                              | 0                      | 0                               | 2                          | 0.000039                            |
| Fairbanks         | 3                     | 0.000059                       | 4                      | 0.000078                        | 7                          | 0.000137                            |
| Gander            | 4                     | 0.000078                       | 10                     | 0.000195                        | 551                        | 0.011907                            |
| Goose Bay         | 3                     | 0.000059                       | 3                      | 0.000059                        | 8                          | 0.000156                            |
| Houston           | 0                     | 0                              | 0                      | 0                               | 3                          | 0.000059                            |
| Iqaluit           | 6                     | 0.000117                       | 29                     | 0.000568                        | 748                        | 0.015999                            |
| Jacksonville      | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Juneau            | 2                     | 0.000039                       | 4                      | 0.000078                        | 4                          | 0.000078                            |
| Kansas City       | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Kotzebue          | 5                     | 0.000098                       | 6                      | 0.000117                        | 128                        | 0.002527                            |
| Los Angeles       | 1                     | 0.000020                       | 1                      | 0.000020                        | 9                          | 0.000176                            |
| Memphis           | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Merida            | 1                     | 0.000020                       | 59                     | 0.001155                        | 88                         | 0.001728                            |
| Mexico City       | 14                    | 0.000277                       | 73                     | 0.001451                        | 395                        | 0.008347                            |
| Miami             | 1                     | 0.000020                       | 1                      | 0.000020                        | 10                         | 0.000195                            |
| Minneapolis       | 1                     | 0.000020                       | 1                      | 0.000020                        | 2                          | 0.000039                            |
| New York          | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Oakland           | 1                     | 0.000020                       | 1                      | 0.000020                        | 96                         | 0.001888                            |
| Puerto Vallarta   | 15                    | 0.000294                       | 111                    | 0.002217                        | 651                        | 0.014151                            |
| Salt Lake City    | 2                     | 0.000039                       | 2                      | 0.000039                        | 3                          | 0.000059                            |
| San Jose Del Cabo | 5                     | 0.000098                       | 77                     | 0.001513                        | 464                        | 0.009755                            |
| Seattle           | 1                     | 0.000020                       | 3                      | 0.000059                        | 3                          | 0.000059                            |
| Washington DC     | 0                     | 0                              | 0                      | 0                               | 0                          | 0                                   |
| Winnipeg          | 2                     | 0.000039                       | 2                      | 0.000039                        | 6                          | 0.000117                            |

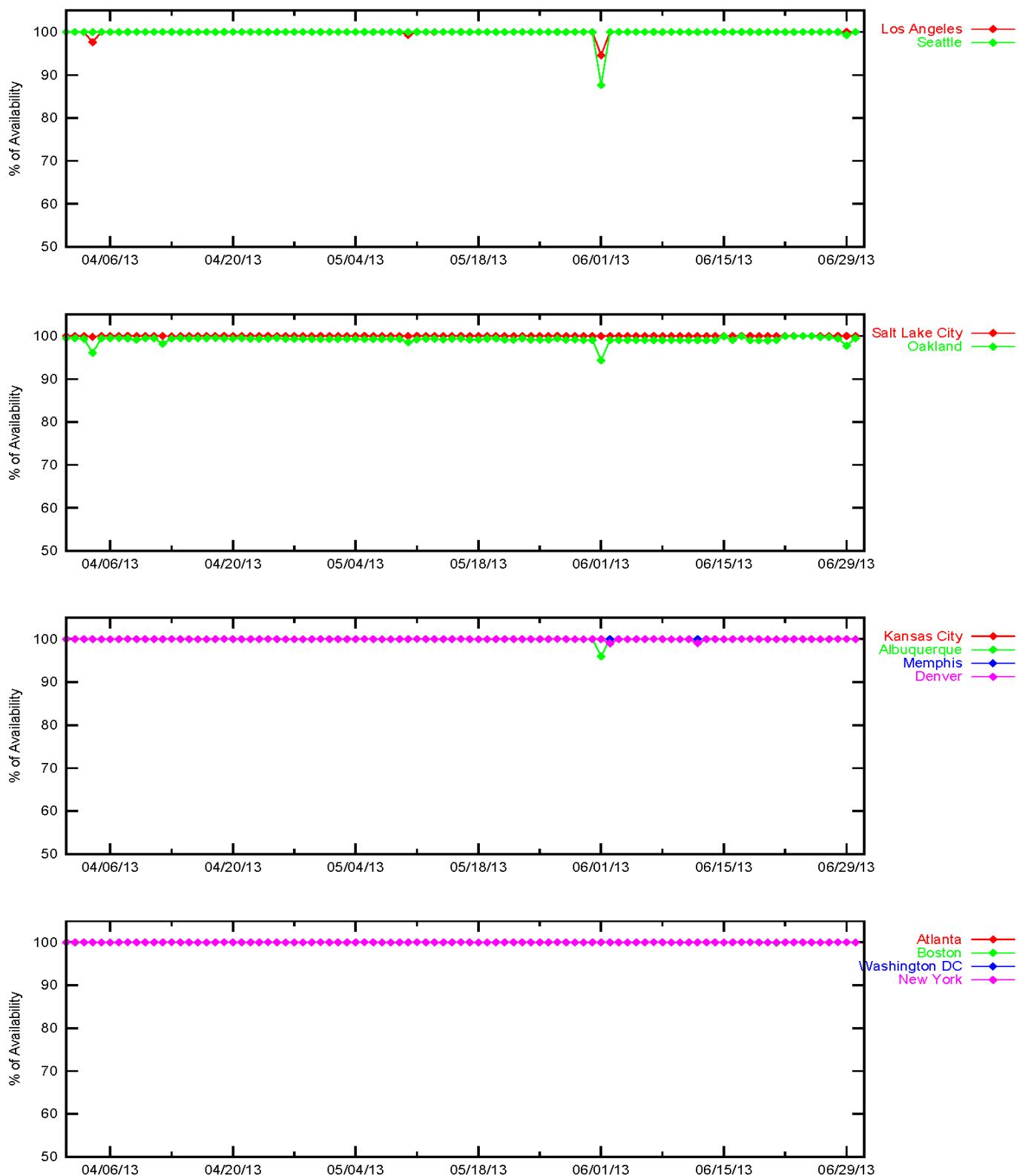
**Table 3-5 NPA Outage Rates (Excluding FD/FDE)**

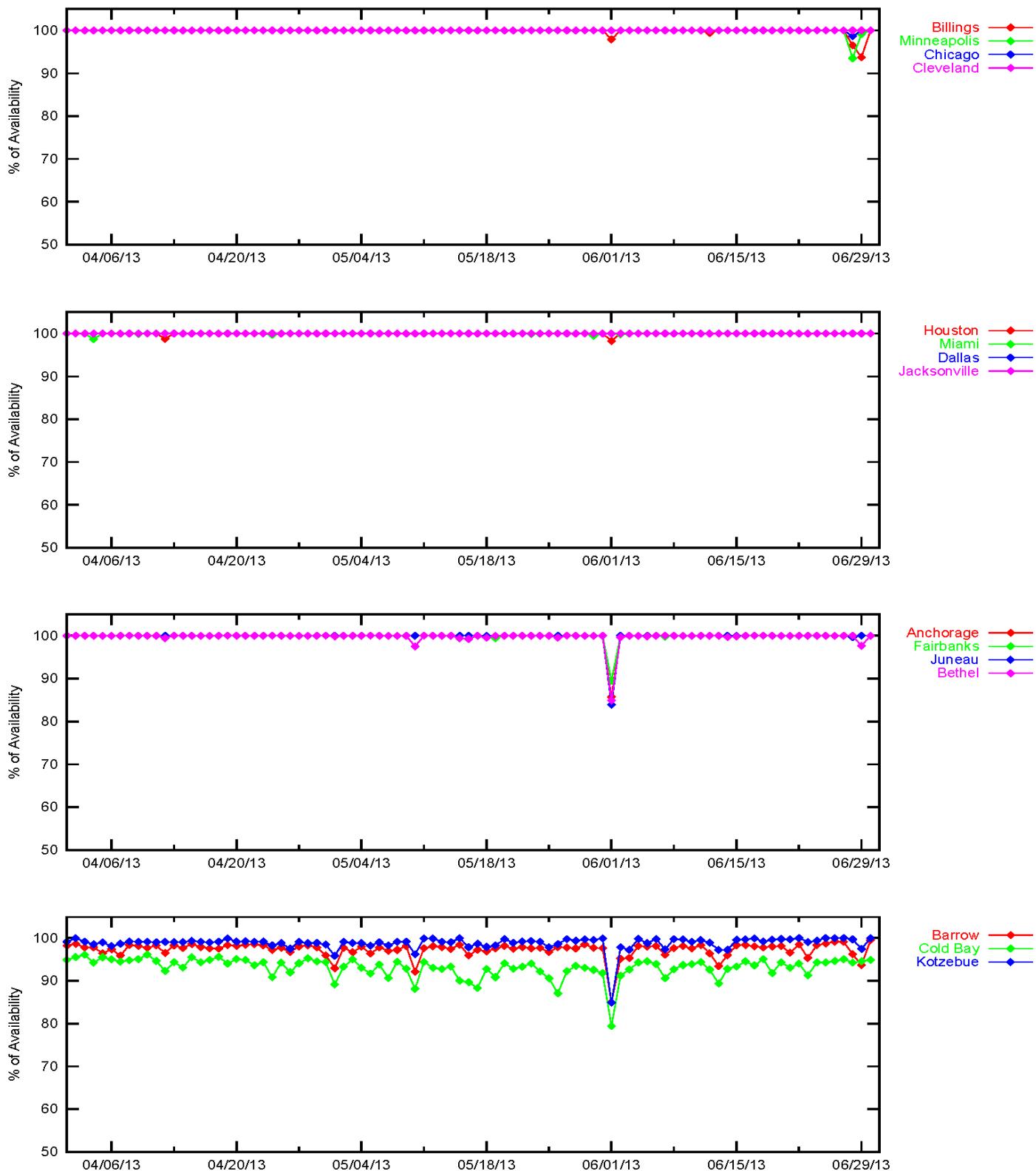
| <b>Location</b>   | <b>NPA Outages</b> | <b>NPA Outage Rate</b> |
|-------------------|--------------------|------------------------|
| Albuquerque       | 0                  | 0                      |
| Anchorage         | 0                  | 0                      |
| Atlanta           | 0                  | 0                      |
| Barrow            | 0                  | 0                      |
| Bethel            | 0                  | 0                      |
| Billings          | 0                  | 0                      |
| Boston            | 0                  | 0                      |
| Cleveland         | 0                  | 0                      |
| Cold Bay          | 0                  | 0                      |
| Fairbanks         | 0                  | 0                      |
| Gander            | 0                  | 0                      |
| Honolulu          | 0                  | 0                      |
| Houston           | 0                  | 0                      |
| Iqaluit           | 0                  | 0                      |
| Juneau            | 0                  | 0                      |
| Kansas City       | 0                  | 0                      |
| Kotzebue          | 0                  | 0                      |
| Los Angeles       | 0                  | 0                      |
| Merida            | 0                  | 0                      |
| Miami             | 0                  | 0                      |
| Minneapolis       | 0                  | 0                      |
| Oakland           | 0                  | 0                      |
| Salt Lake City    | 0                  | 0                      |
| San Jose Del Cabo | 0                  | 0                      |
| San Juan          | 0                  | 0                      |
| Seattle           | 0                  | 0                      |
| Tapachula         | 0                  | 0                      |
| Washington DC     | 0                  | 0                      |

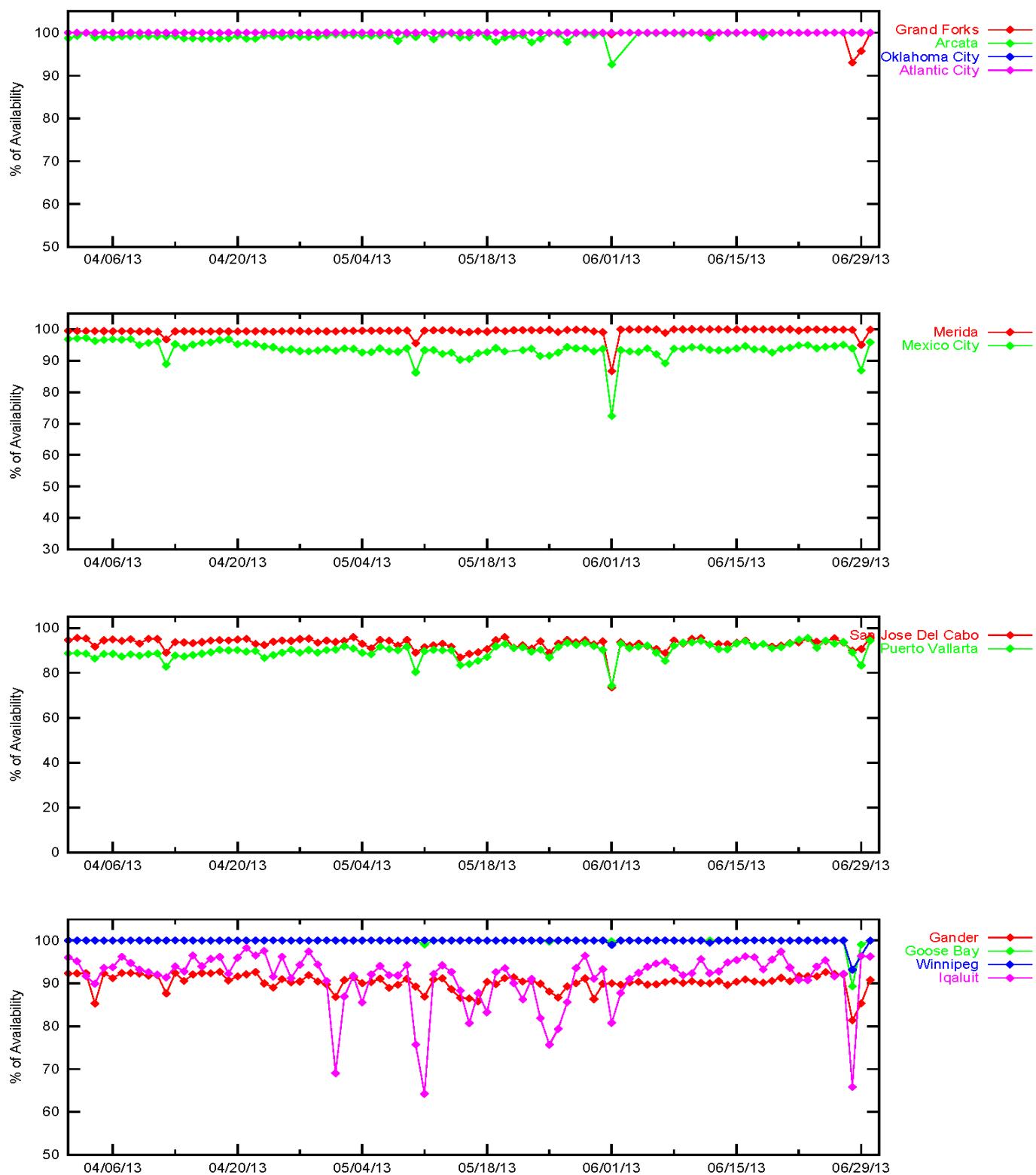
**Figure 3-1 LPV Instantaneous Availability**

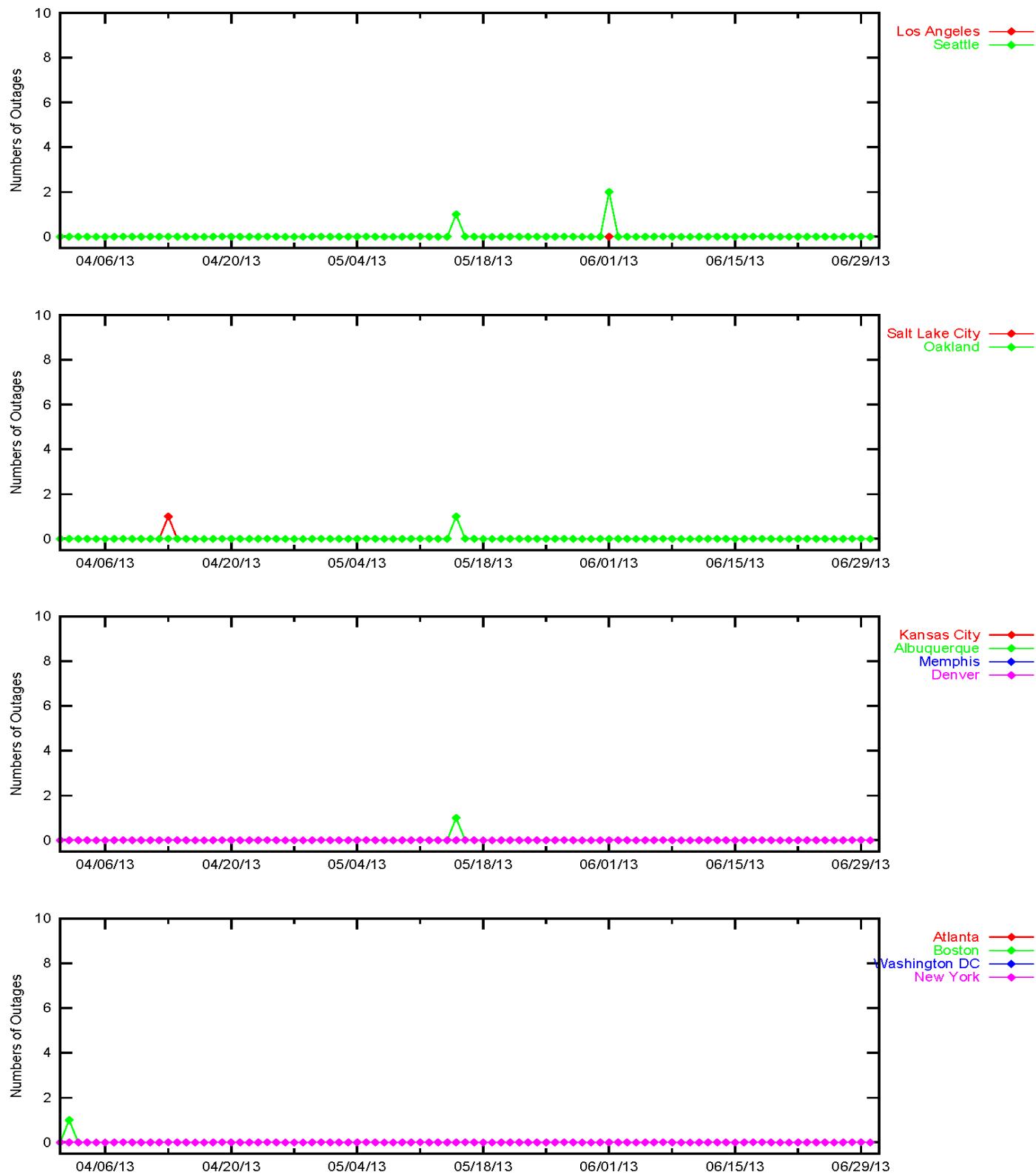
**Figure 3-2 LPV Instantaneous Availability**

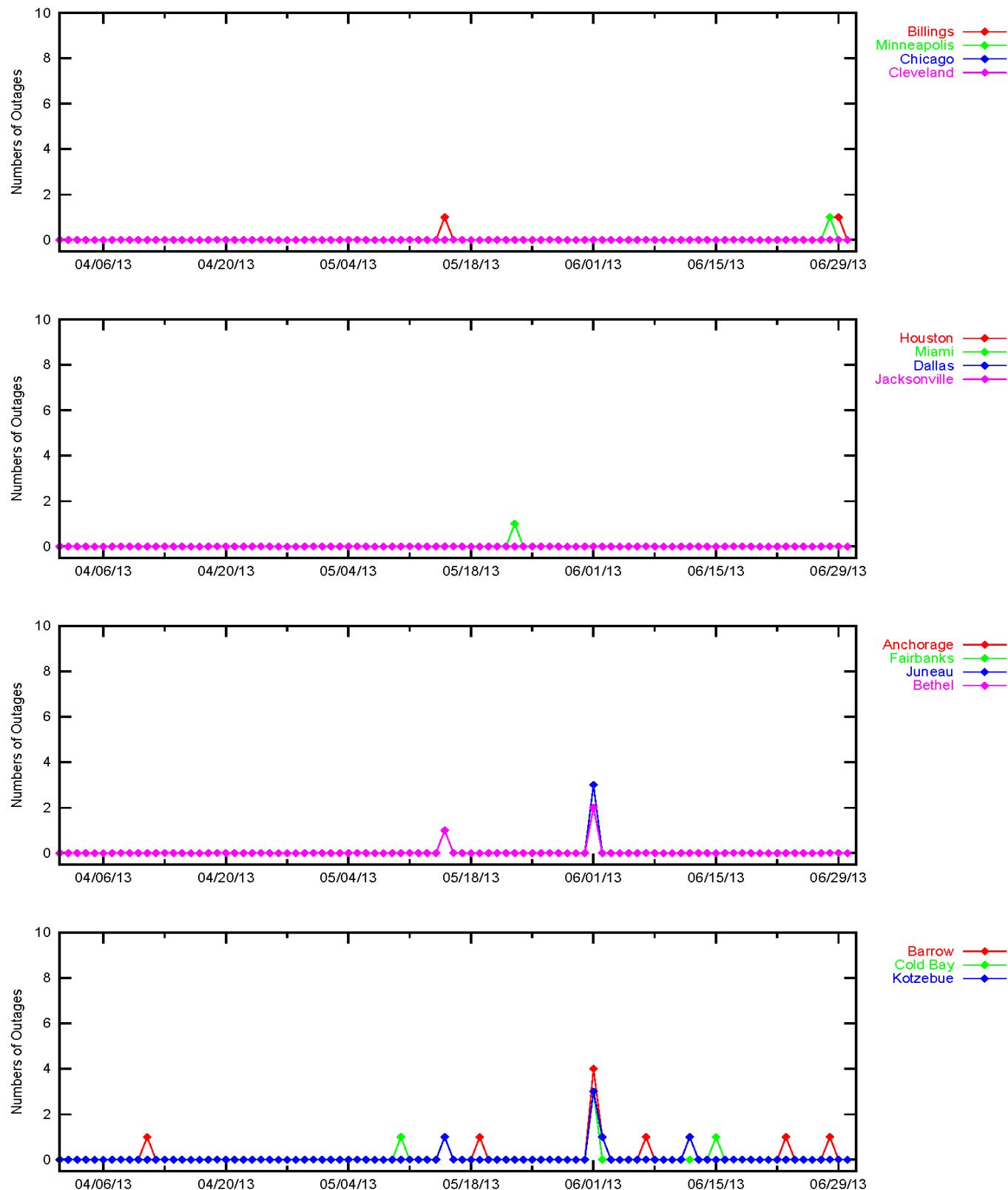
**Figure 3-3 LPV Instantaneous Availability**

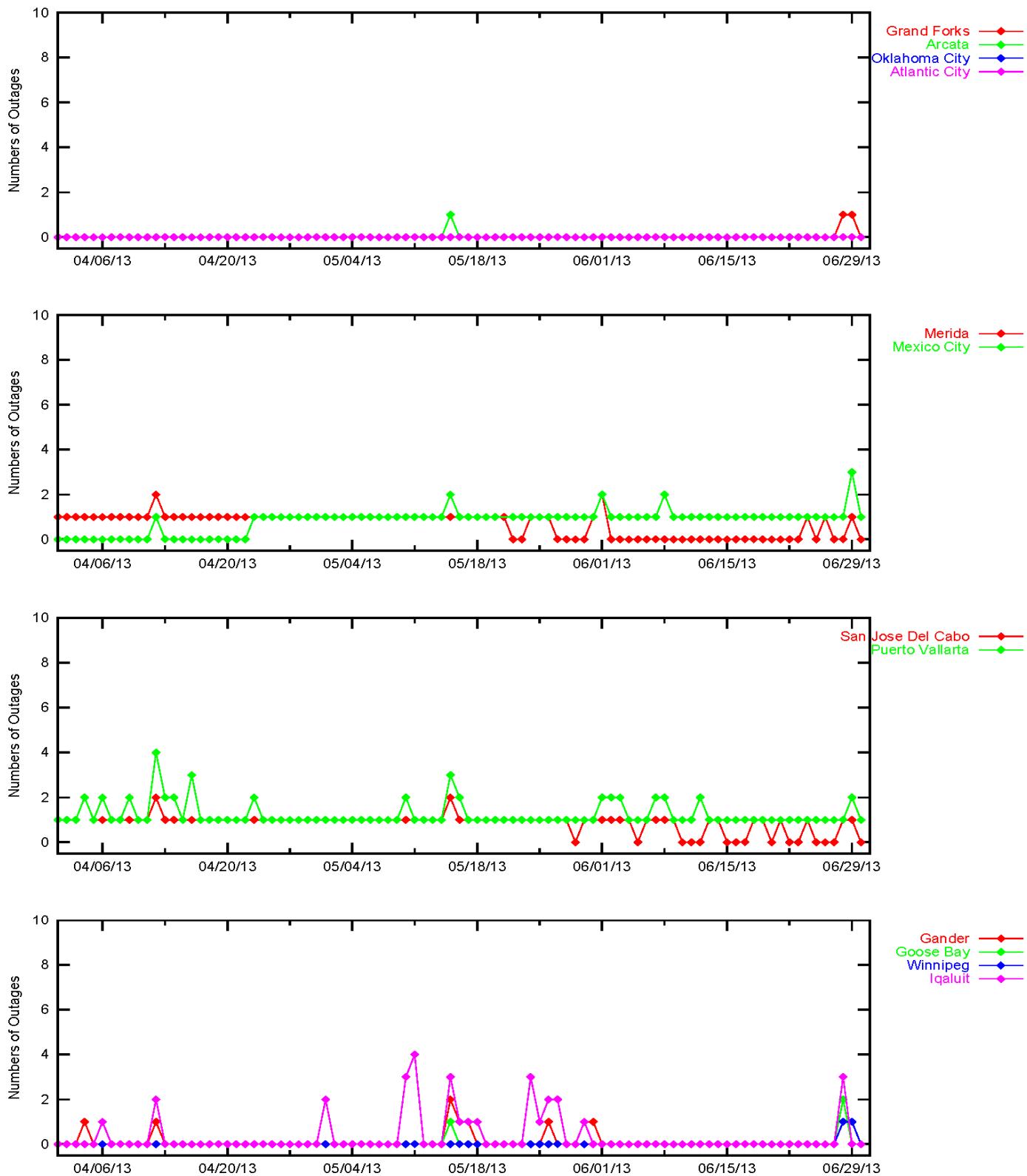
**Figure 3-4 LPV 200 Instantaneous Availability**

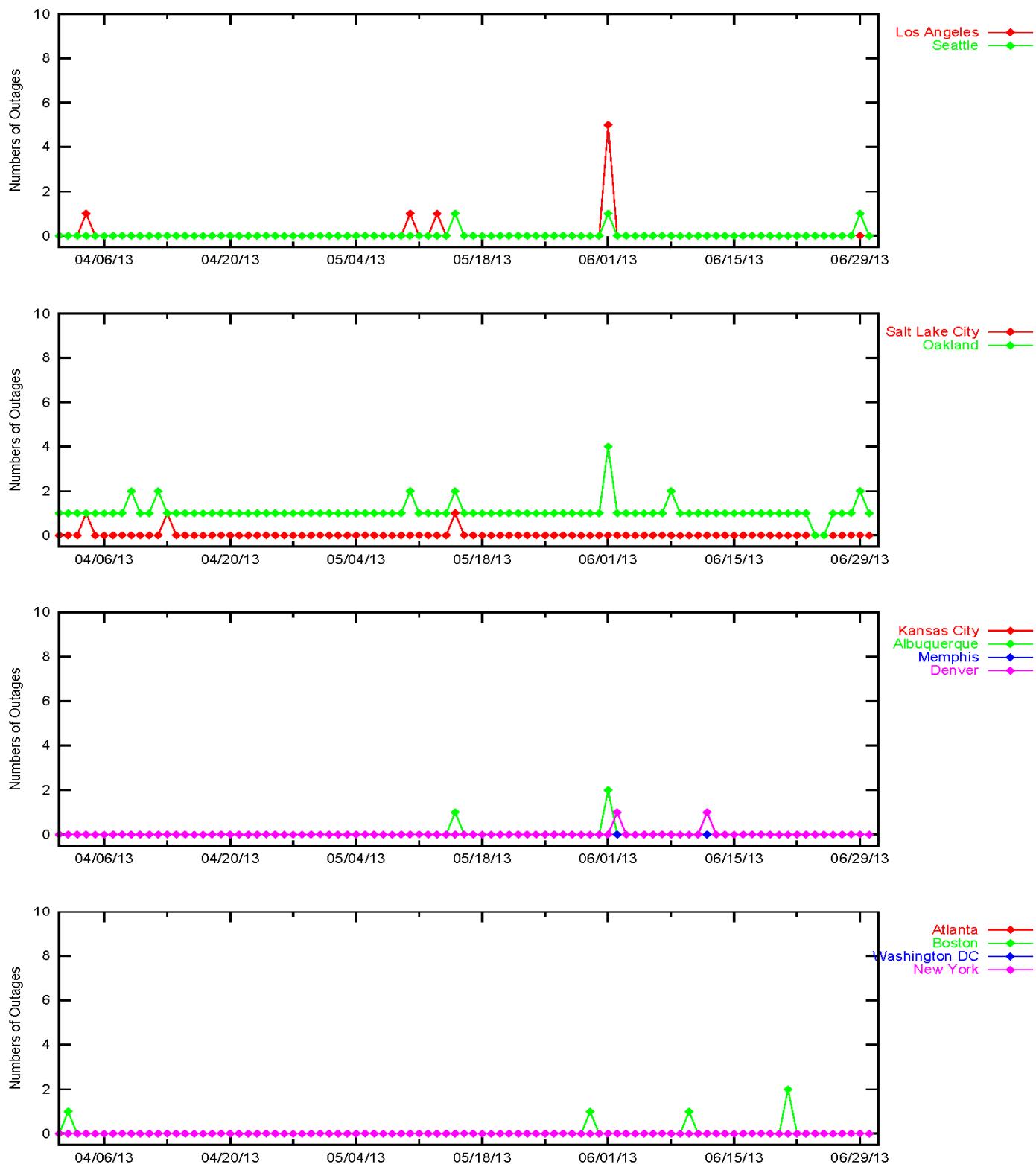
**Figure 3-5 LPV 200 Instantaneous Availability\**

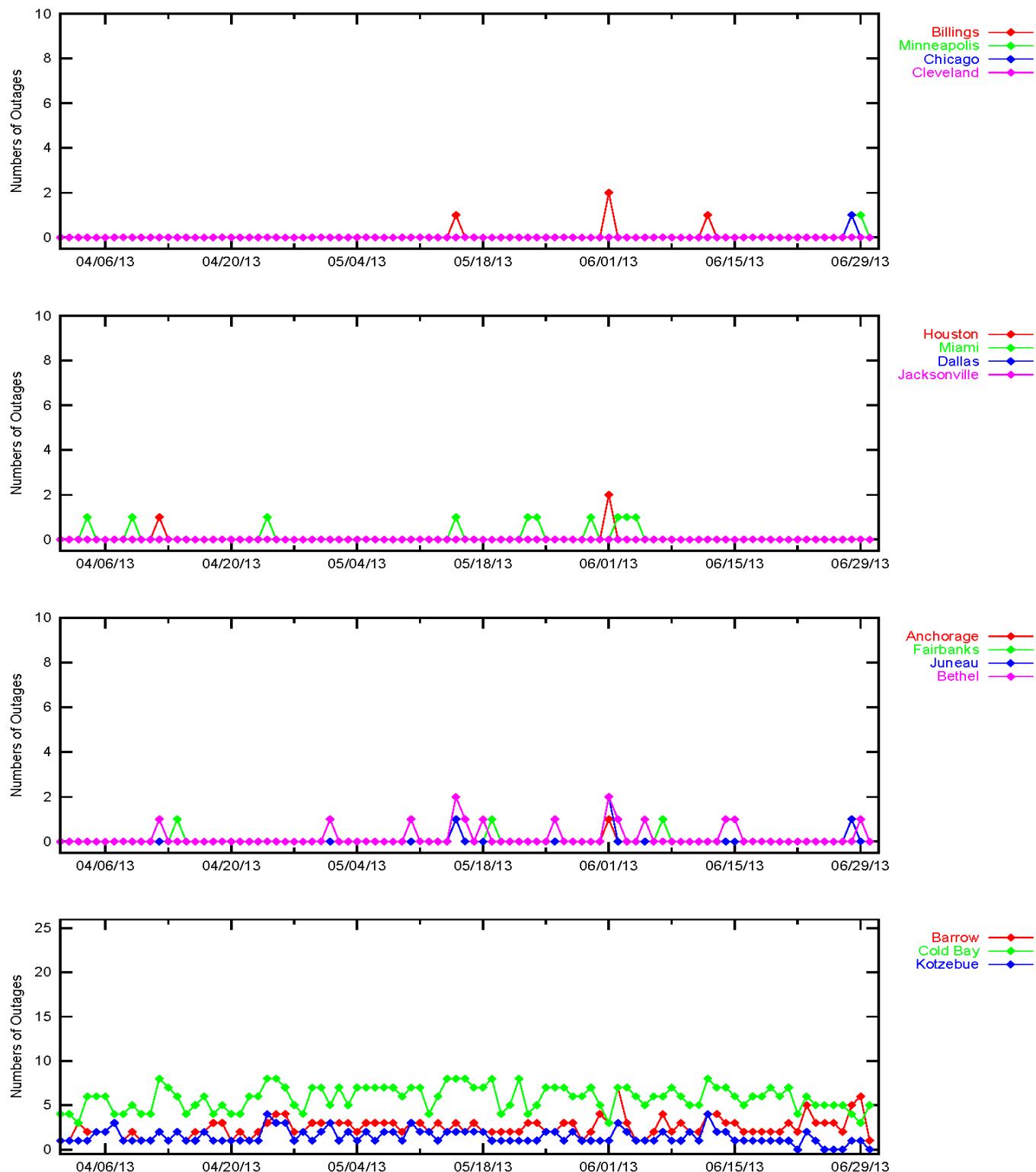
**Figure 3-6 LPV 200 Instantaneous Availability**

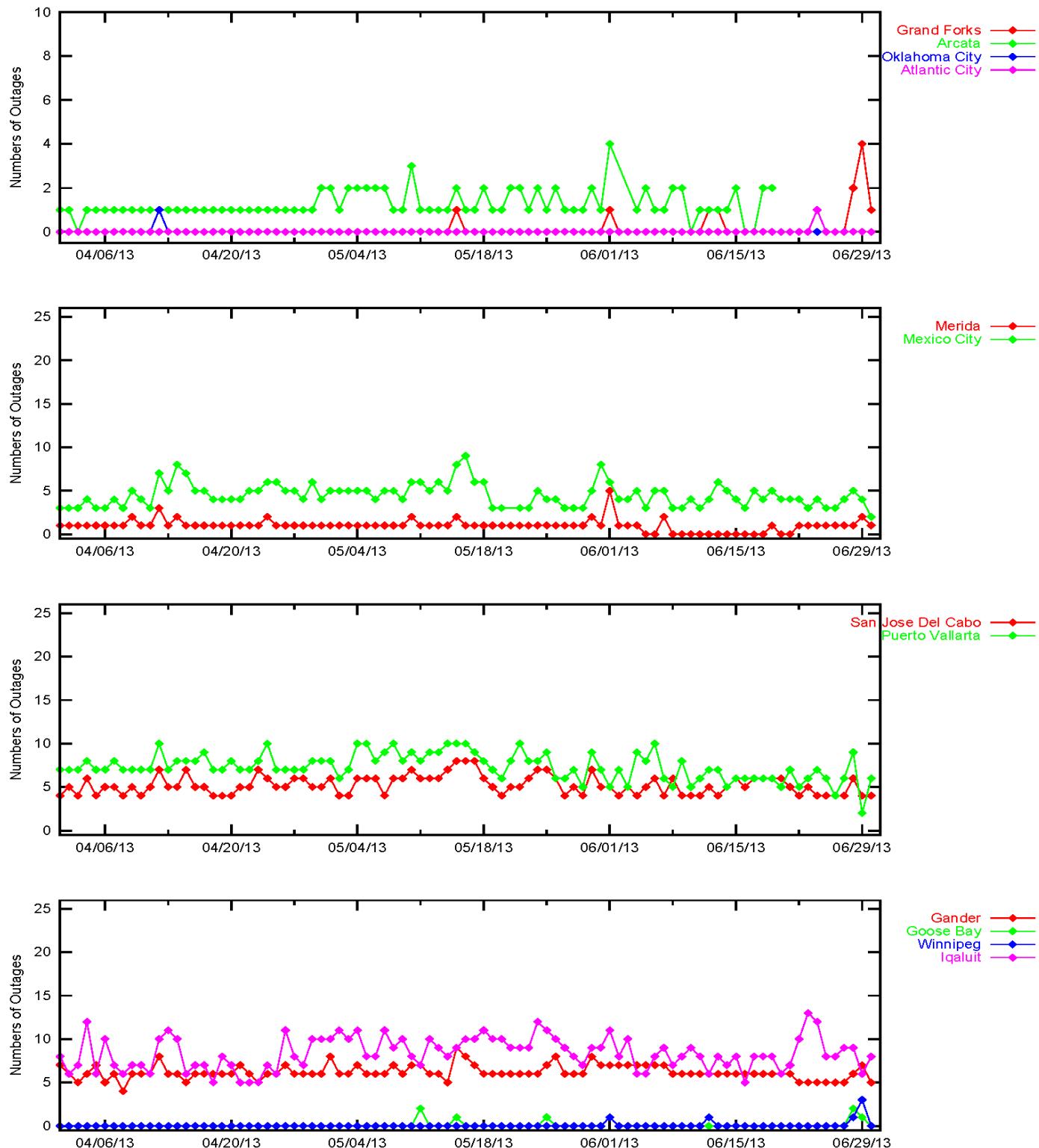
**Figure 3-7 LPV Outages**

**Figure 3-8 LPV Outages**

**Figure 3-9 LPV Outages**

**Figure 3-10 LPV 200 Outages**

**Figure 3-11 LPV 200 Outages**

**Figure 3-12 LPV 200 Outages**

## 4.0 COVERAGE

The WAAS coverage area evaluation estimates the percent of service volume where WAAS provided service for the operational service levels defined in Table 1-1. The WAAS message and the GPS/GEO satellite status are used to determine WAAS availability across North America. For PA coverage, protection levels were calculated at 30-sec intervals at one degree spacing over the PA service volume, while NPA coverage were calculated at 30-sec intervals at five degree spacing over the NPA service volume.

Daily analysis for PA was conducted for LP, LPV and LPV 200 service levels. The coverage plots provide 100, 99.9, 99, 98 and 95% availability contours. Figure 4-1 shows the rollup LP North America coverage. Figure 4-2 shows the rollup LPV North America coverage. Figure 4-3 shows the rollup LPV 200 North America coverage. Figure 4-6 shows the daily LPV and LPV 200 CONUS coverage, and Figure 4-7 shows the daily LPV Alaska coverage at 99% availability and ionosphere Kp index values for this quarter. Figure 4-8 shows the daily LPV and LPV 200 Canada coverage at 99% availability and ionosphere Kp index values for this quarter. Please see Appendix B for coverage plots of 98% LP and LPV availability contour, and 99% LPV 200 availability contour. Kp quantifies the disturbance in the earth's magnetic field and is an indicator of solar storms causing geomagnetic disturbances that can cause the ionosphere to become unpredictable. WAAS increases GIVE values making PA service unavailable when WAAS detects that the ionosphere is disturbed.

Daily analysis for NPA was conducted for RNP 0.1 and RNP 0.3 service levels based on a 100% availability requirement. RNP 0.1 service is asserted to be available when HPL is less than 185 meters and RNP 0.3 service is asserted to be available when HPL is less than 556 meters. The NPA coverage plots provide 100, 99.9 and 99% availability contours. Figure 4-4 shows the rollup RNP 0.1 coverage and Figure 4-5 shows the rollup RNP 0.3 coverage for the quarter. Figure 4-9 shows the daily RNP coverage at 100% availability and ionosphere Kp index values for this quarter.

The coverage decreases for this quarter are mostly due to GUS switchovers, satellite outages, carrier phase anomalies, geomagnetic activity, and elevated UDRE and GIVE values. Please refer to Table 1-5 for all the events that affected coverage.

Increase in WAAS coverage was observed after June 22nd when PRN-27 was added to GPS satellite constellation.

Manual GUS switchover on CRE GEO (PRN-138) on April 12th and May 30th elevated UDRE values and caused minor reduction in Canada coverage. Manual GUS switchover on CRW GEO (PRN-135) on June 2nd elevated UDRE values and reduced coverage in CONUS, Alaska and Canada. Faulted GUS switchover on CRW GEO (PRN-135) on Jun 12th elevated UDRE values and reduced coverage in CONUS, Alaska and Canada. GUS hardware failure of PNE CRE GEO (PRN-138) on May 15th caused missed navigation messages and two seconds service outage in CONUS, Alaska and Canada. [See DR 114 "LPV Service Outage Due to Consecutive SV Alerts on PRN 138"](#) for a more detailed description.

A brief carrier phase anomaly on PRN-21 on May 30th and June 8th caused WAAS to issue a SV alert setting PRN-21 to "Not Monitored" resulted in a minor reduction in LPV-200 CONUS coverage; the carrier phase anomaly on June 8th also reduced Mexico coverage. A brief carrier phase anomaly on PRN-32 on June 24th caused WAAS to issue a SV alert setting PRN-32 to "Not Monitored" resulted in a minor reduction in LPV-200 Alaska and Canada coverage.

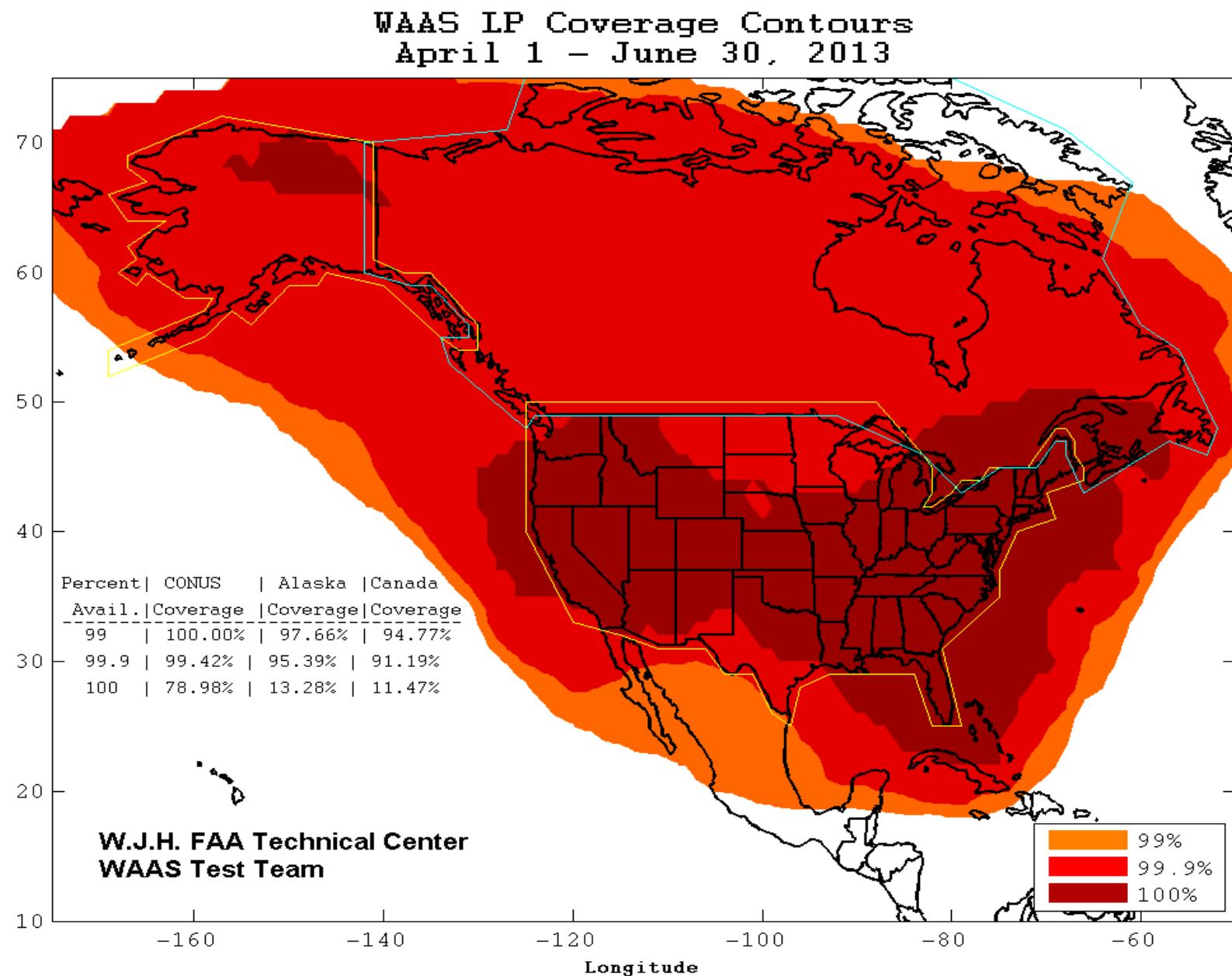
Geomagnetic activity on April 24th elevated GIVE values and slightly reduced CONUS, Alaska, Canada and Mexico coverage. Geomagnetic activity on May 1st and May 16-19th caused minor coverage drop at Alaska and Canada. Geomagnetic activity on June 1st significantly reduced CONUS, Alaska, Canada, and Mexico coverage. [See DR 115 "Effect on WAAS from Iono Activity on 01June2013"](#) for a more detailed description. Geomagnetic activity on June 28-29th elevated GIVE values and significantly affected CONUS, Alaska and Canada coverage.

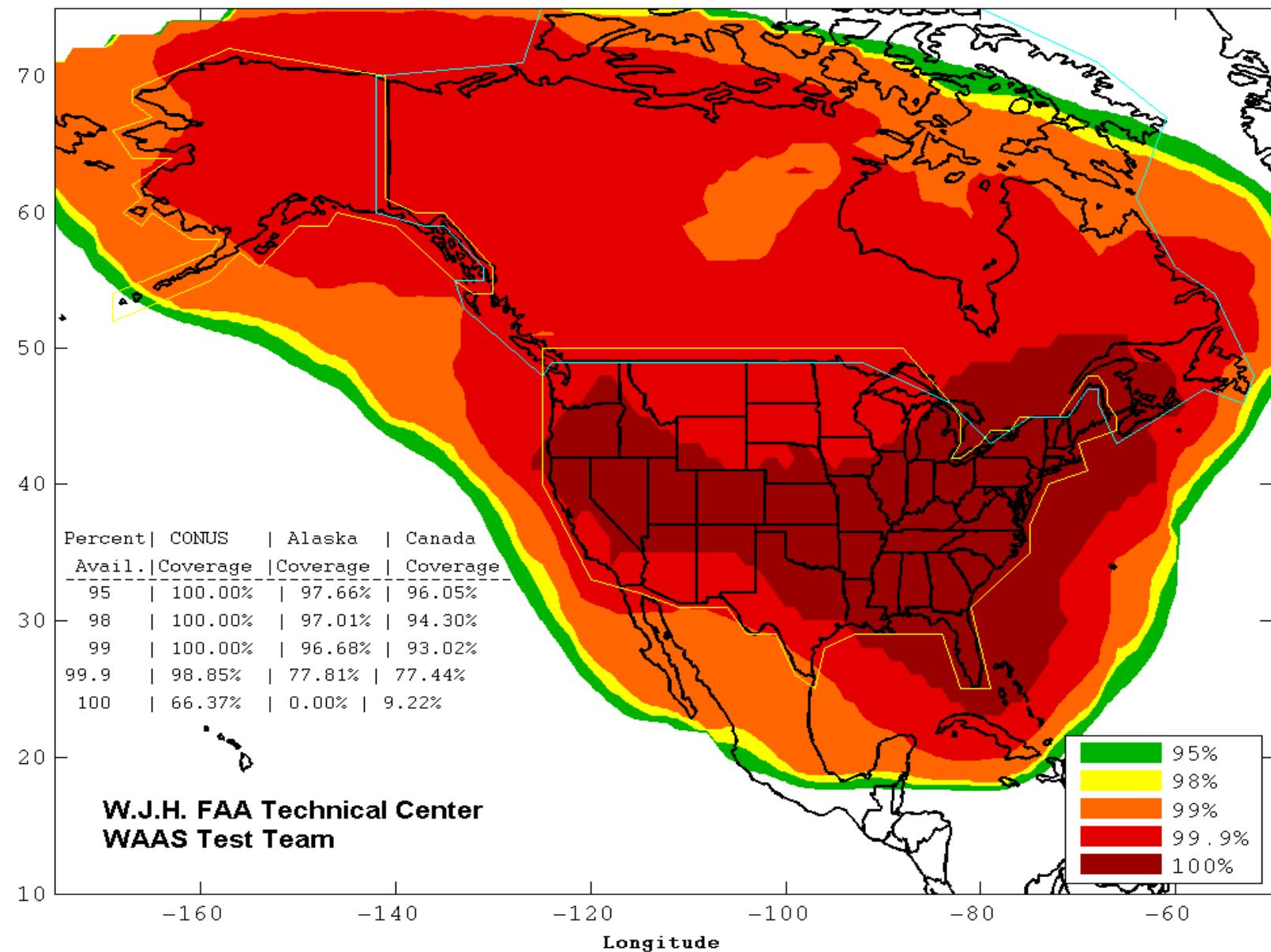
Planned maintenance on PRN-18 on April 4th affected CONUS, Alaska and Canada coverage. Planned maintenance on PRN-8 on April 11th reduced CONUS and Mexico coverage. Planned maintenance on PRN-25 on May 10-11th affected CONUS, Alaska and Canada coverage.

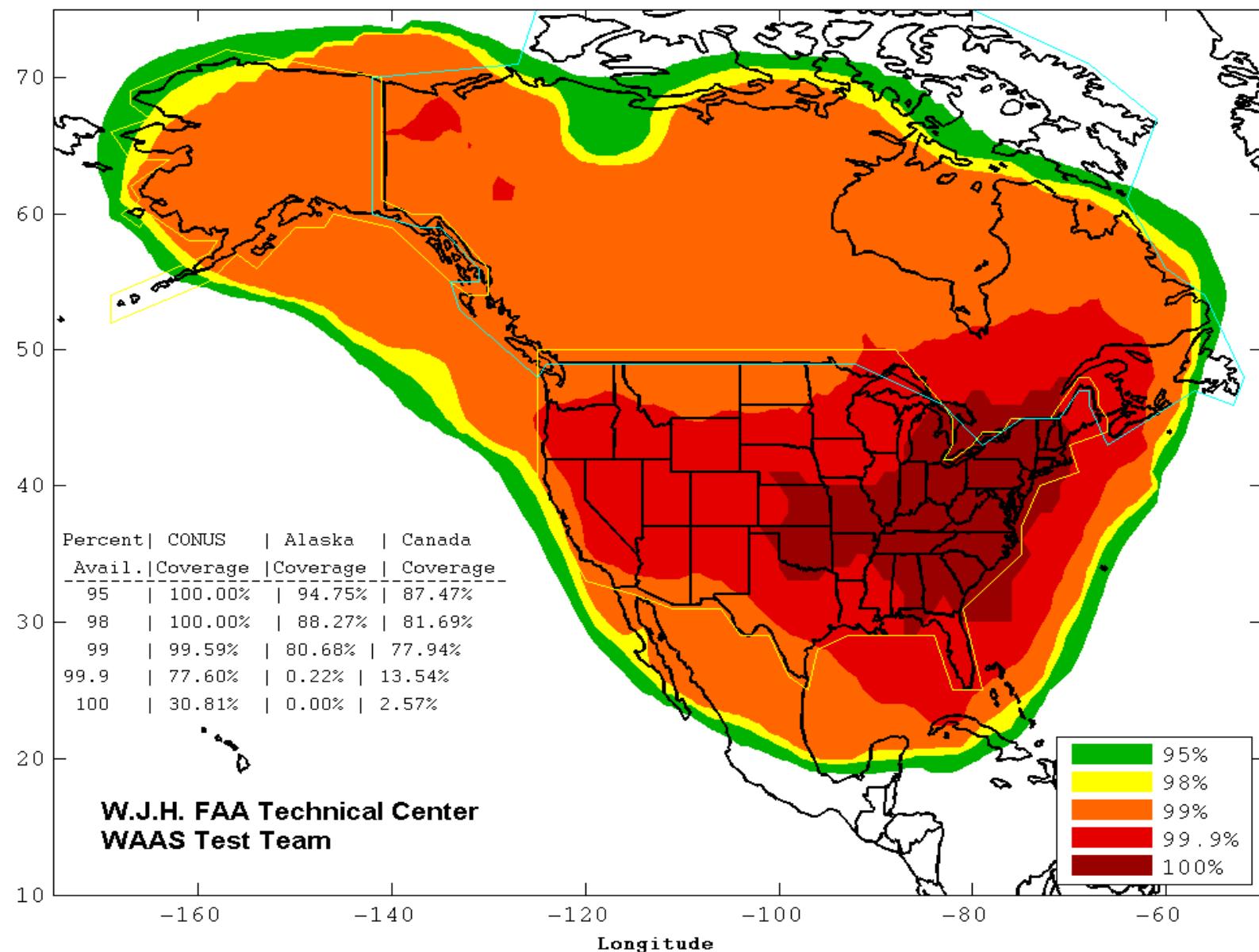
Intermittent communication outages at Iqaluit on May 10th increased GIVE values at northern latitudes due to the loss of data from Iqaluit reference stations and resulted in minor coverage reduction in Northern Canada.

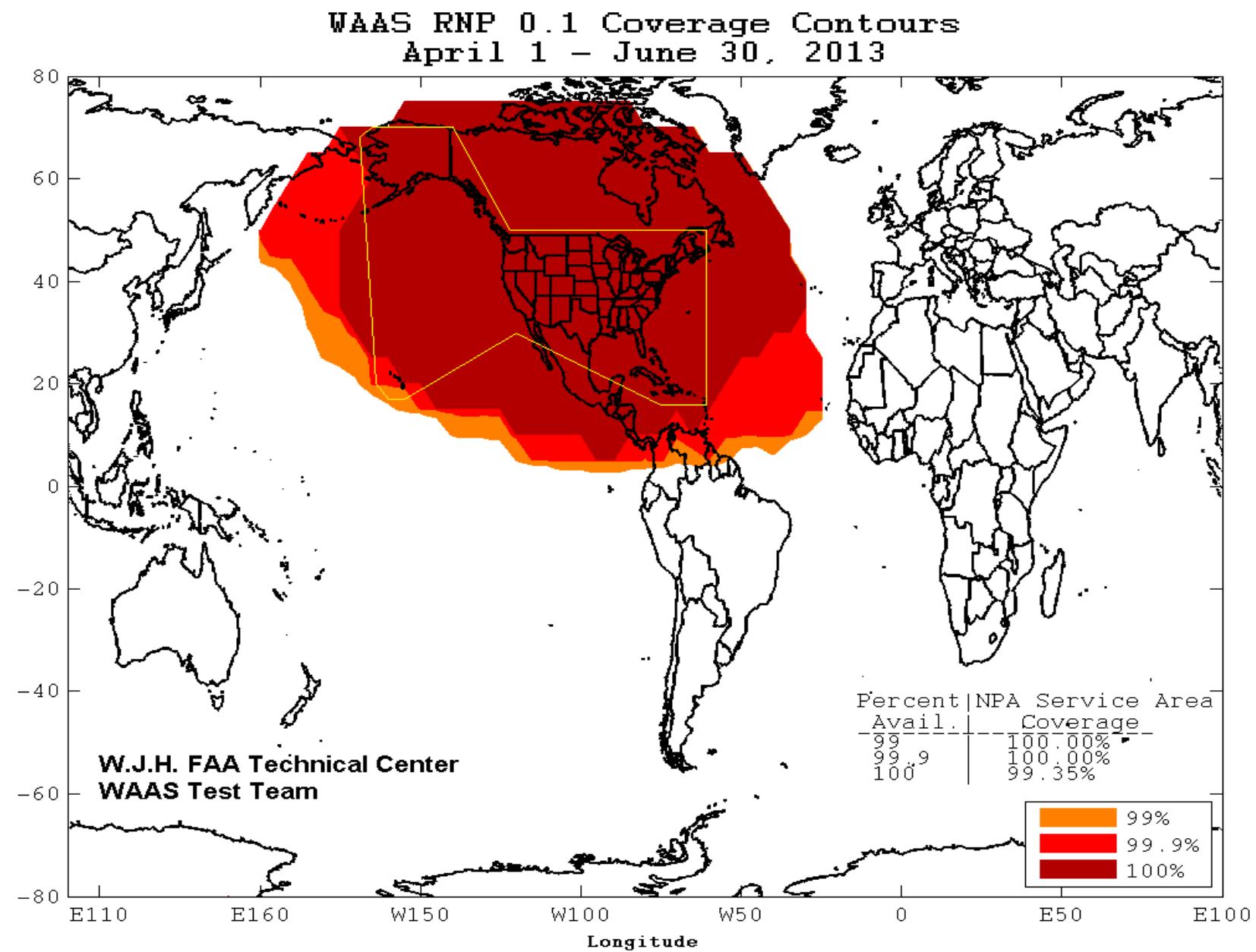
Communication outages at Cold Bay, Bethel and Juneau on June 14th increased GIVE values and caused slight coverage reduction in Alaska.

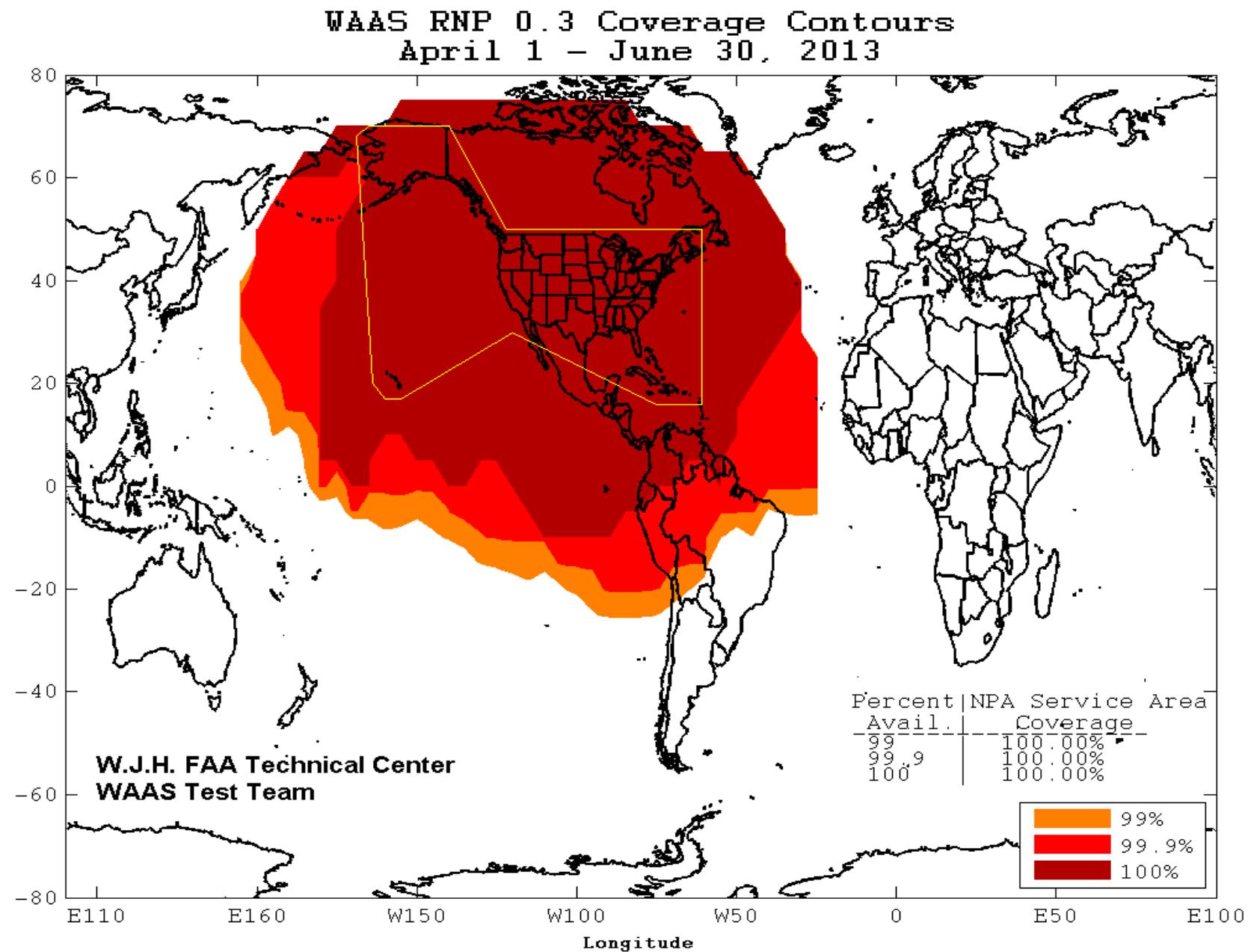
Radio frequency interference (RFI) caused localized loss of LPV/LPV200 coverage at Boston on April 2<sup>nd</sup>, June 10<sup>th</sup>, and June 21<sup>st</sup>, at Salt Lake City on April 13<sup>th</sup>, at Los Angeles on May 13<sup>th</sup>, and at Miami on May 23<sup>rd</sup>, but had no effect on WAAS service.

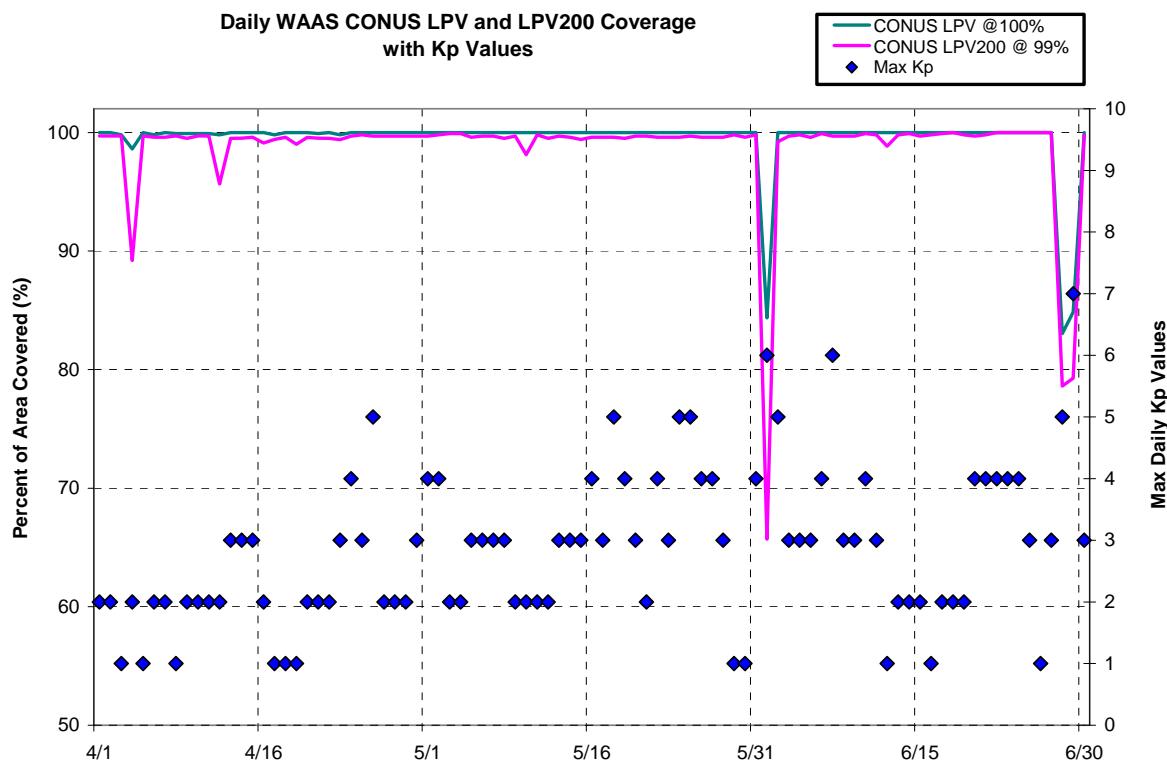
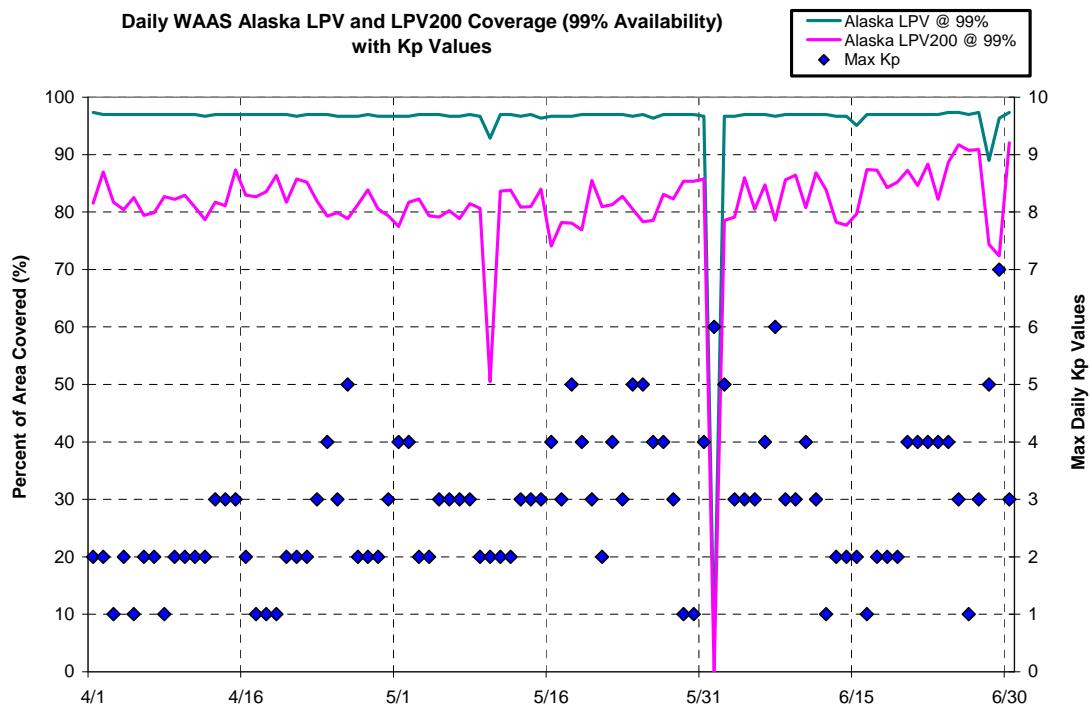
**Figure 4-1 LP North America Coverage for the Quarter**

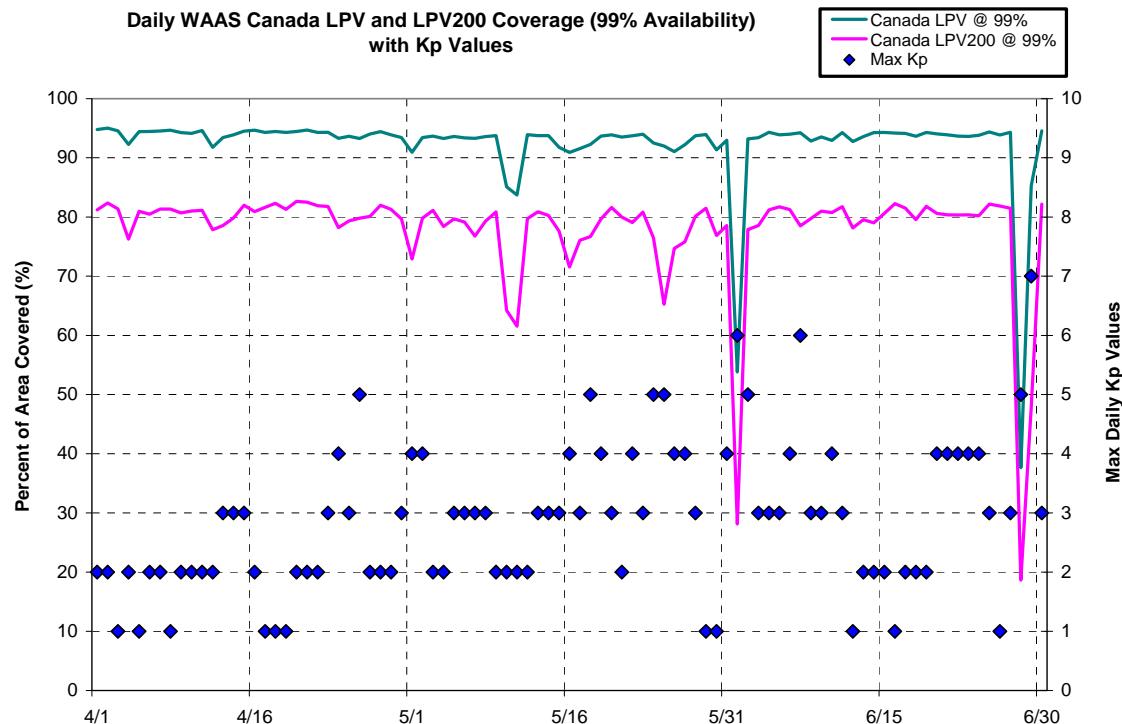
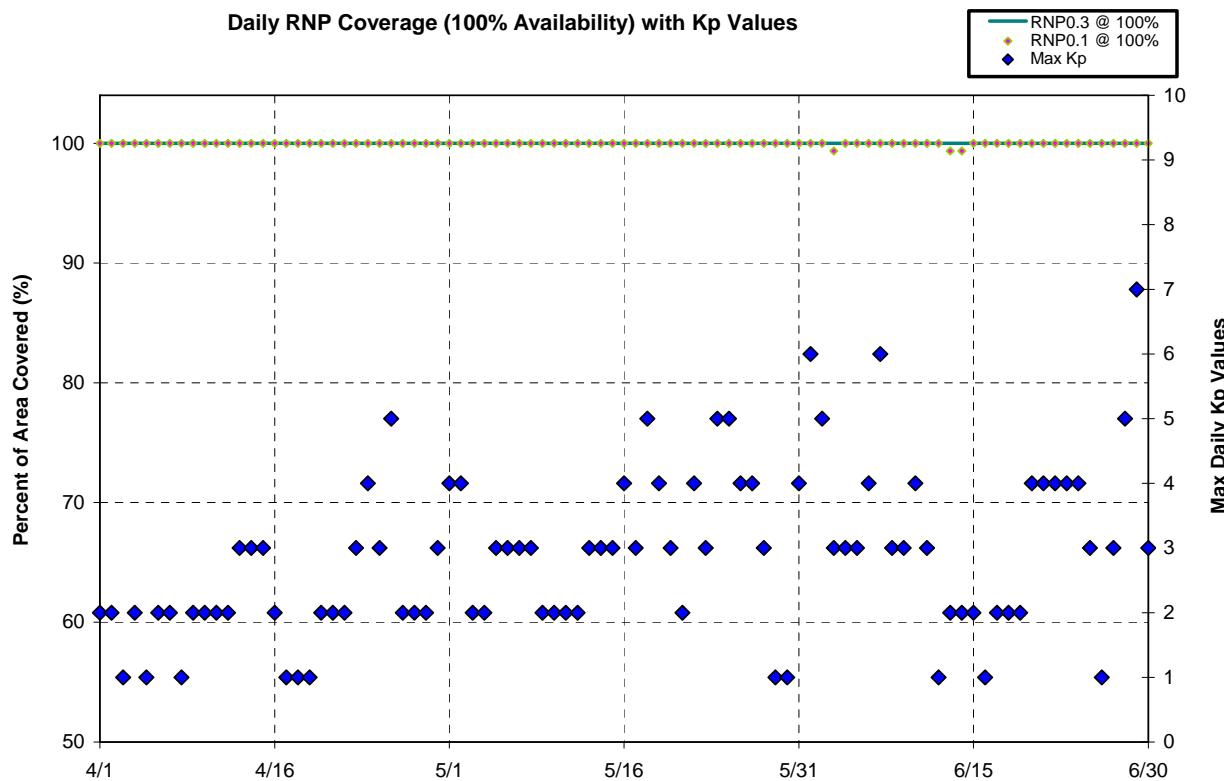
**Figure 4-2 LPV North America Coverage for the Quarter****WAAS LPV Coverage Contours  
April 1 – June 30, 2013**

**Figure 4-3 LPV 200 North America Coverage for the Quarter****WAAS LPV200 Coverage Contours  
April 1 – June 30, 2013**

**Figure 4-4 RNP 0.1 Coverage for the Quarter**

**Figure 4-5 RNP 0.3 Coverage for the Quarter**

**Figure 4-6 Daily LPV and LPV 200 CONUS Coverage****Figure 4-7 Daily LPV and LPV 200 Alaska Coverage**

**Figure 4-8 Daily LPV and LPV 200 Canada Coverage****Figure 4-9 Daily RNP Coverage**

## 5.0 INTEGRITY

### 5.1 HMI Analysis

Analysis of integrity includes the identification and evaluation of HMI (hazardously misleading information), as well as the generation of a safety index to illustrate the margin of safety that WAAS protection levels are providing. The safety index is a metric that shows how well the protection levels are bounding the maximum observed error when LPV service is available. The process for determining this index involves dividing the protection limit observed by the maximum observed error. An observed safety index of greater than one indicates safe bounding of the greatest observed error, less than one indicates that the maximum error was not bounded, and a result equal to one means that the error was equal to the protection level. An HMI occurs if the position error exceeds the protection level in the vertical or horizontal dimensions at any time and 6.2 seconds or more passes before this event is corrected by WAAS.

Table 5-1 lists the safety index and the number of HMI events. For this evaluation period, the lowest safety margin index is 3.72 at Seattle. There was no HMI event. Since WAAS was made available to the public in August 2000 there has not been an HMI event. WAAS was commissioned by the FAA for safety of life services in July 2003.

**Table 5-1 Safety Margin Index and HMI Statistics**

| Location          | Safety Index |          | Number of HMIs |
|-------------------|--------------|----------|----------------|
|                   | Horizontal   | Vertical |                |
| Arcata            | 4.68         | 7.74     | 0              |
| Atlantic City     | 4.83         | 5.79     | 0              |
| Grand Forks       | 5.89         | 6.22     | 0              |
| Oklahoma City     | 4.77         | 5.49     | 0              |
| Albuquerque       | 11.86        | 7.82     | 0              |
| Anchorage         | 8.87         | 6.51     | 0              |
| Atlanta           | 6.77         | 6.10     | 0              |
| Barrow            | 5.46         | 5.10     | 0              |
| Bethel            | 8.30         | 6.11     | 0              |
| Billings          | 4.33         | 5.08     | 0              |
| Boston            | 5.32         | 6.45     | 0              |
| Chicago           | 7.29         | 9.02     | 0              |
| Cleveland         | 6.82         | 4.78     | 0              |
| Cold Bay          | 9.58         | 9.65     | 0              |
| Dallas            | 7.71         | 7.94     | 0              |
| Denver            | 6.91         | 6.31     | 0              |
| Fairbanks         | 4.14         | 4.17     | 0              |
| Gander            | 8.41         | 7.75     | 0              |
| Goose Bay         | 10.56        | 5.29     | 0              |
| Houston           | 4.95         | 6.37     | 0              |
| Iqaluit           | 8.79         | 9.37     | 0              |
| Jacksonville      | 7.88         | 4.19     | 0              |
| Juneau            | 11.77        | 4.74     | 0              |
| Kansas City       | 5.33         | 5.72     | 0              |
| Kotzebue          | 10.37        | 6.79     | 0              |
| Los Angeles       | 10.75        | 7.63     | 0              |
| Memphis           | 6.06         | 4.47     | 0              |
| Merida            | 9.45         | 6.19     | 0              |
| Mexico City       | 5.04         | 4.83     | 0              |
| Miami             | 6.96         | 9.18     | 0              |
| Minneapolis       | 9.80         | 11.74    | 0              |
| New York          | 5.92         | 5.44     | 0              |
| Oakland           | 4.89         | 7.92     | 0              |
| Puerto Vallarta   | 8.93         | 6.45     | 0              |
| Salt Lake City    | 7.28         | 7.73     | 0              |
| San Jose Del Cabo | 8.01         | 5.03     | 0              |
| Seattle           | 7.85         | 3.72     | 0              |
| Washington DC     | 5.98         | 5.69     | 0              |
| Winnipeg          | 5.77         | 5.06     | 0              |

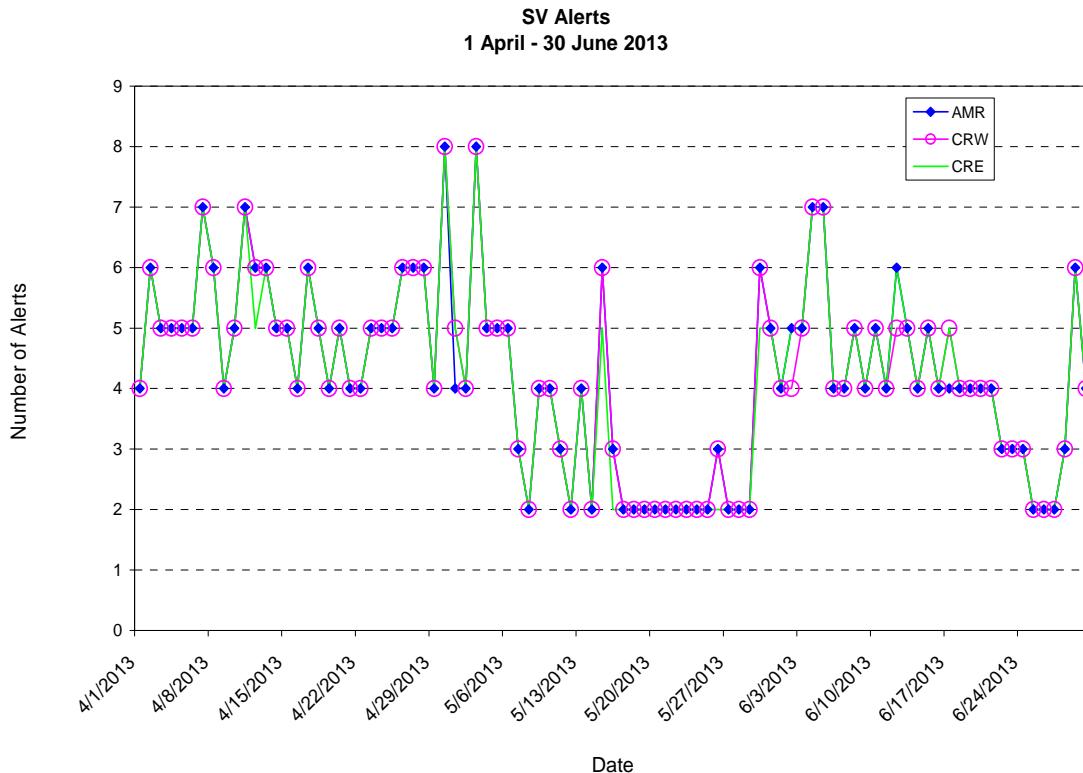
## 5.2 Broadcast Alerts

The WAAS transmits alert messages to protect the users if the active WAAS corrections are no longer bound by the UDREs. Alerts increase the User Differential Range Error (UDRE) for one or more PRNs, which can reduce the weighting of the satellite in the navigation solution, or completely exclude the satellite from the navigation solution. An increase in UDRE's after an alert effectively increases the user protection levels (HPL and VPL), which affects the availability. Additionally, if an alert message sequence lasts for more than 12 seconds, WAAS fast corrections can time out, causing a loss of continuity. Table 5-2 shows the total number of alerts and the average number of alerts per day. Figure 5-1 shows the number of SV alerts that occurred daily during the reporting period. Often the number of alerts on one GEO is the same as the number of alerts on the other GEO. Therefore, lines tend to overlap in most points on this plot.

**Table 5-2 WAAS SV Alert**

| <b>Message Type</b> | <b>Number of Alerts</b> |            |            | <b>Average Alerts Per Day</b> |            |            |
|---------------------|-------------------------|------------|------------|-------------------------------|------------|------------|
|                     | <b>AMR</b>              | <b>CRW</b> | <b>CRE</b> | <b>AMR</b>                    | <b>CRW</b> | <b>CRE</b> |
| 2                   | 25                      | 25         | 25         | 0.2747                        | 0.2747     | 0.2747     |
| 3                   | 14                      | 14         | 14         | 0.1538                        | 0.1538     | 0.1538     |
| 4                   | 347                     | 347        | 344        | 3.8132                        | 3.8132     | 3.7802     |
| 5                   | 0                       | 0          | 0          | 0.0000                        | 0.0000     | 0.0000     |
| 6                   | 0                       | 0          | 0          | 0.0000                        | 0.0000     | 0.0000     |
| 24                  | 0                       | 0          | 0          | 0.0000                        | 0.0000     | 0.0000     |
| 26                  | 0                       | 0          | 0          | 0.0000                        | 0.0000     | 0.0000     |
| Total Alerts        | 386                     | 386        | 383        | 4.2418                        | 4.2418     | 4.2088     |
| Days in Service     | 91                      | 91         | 91         |                               |            |            |

**Figure 5-1 SV Daily Alert Trend**



### 5.3 Availability of WAAS Messages (CRE, CRW, and AMR)

For an accurate and current user position to be calculated, the content of the WAAS message must be broadcast and received within precise time specifications. This aspect of the WAAS is critical to maintaining continuity requirements. Each message type in the WAAS SIS has a specific timeout interval and an expected worst case broadcast interval. Table 5-3 lists the maximum intervals at which each message must broadcast to meet system requirements.

GUS switchovers or broadcast WAAS alerts can interrupt the normal broadcast message stream. If these events occur at a time when the maximum interval of a specific message is approaching, that message may be delayed, resulting in its late transmittal.

Late messages statistics reported during the quarter were mainly caused by GEO SIS outages, GUS switchovers and SV alerts except message type 7 and 10. Occasionally, message type 7 and 10 were late and they were not caused by GEO SIS outages, GUS switchovers or SV alerts. The lateness of type 7 and type 10 messages has little or no impact on user performance and safety.

Tables 5-4 to 5-8 show fast correction, long correction, ephemeris covariance, ionosphere correction, and ionospheric mask message rates statistics broadcasted on AMR GEO. Table 5-9 to 5-13 show message rates statistics broadcasted on CRW GEO. Table 5-14 to 5-18 show message rates statistics on CRE GEO.

**Table 5-3 Update Rates for WAAS Messages**

| Data                        | Associated Message Types | Maximum Update Interval (seconds) | En Route, Terminal, NPA Timeout (seconds) | Precision Approach Timeout (seconds) |
|-----------------------------|--------------------------|-----------------------------------|---|--------------------------------------|
| WAAS in Test Mode           | 0                        | 6                                 | N/A                                       | N/A                                  |
| PRN Mask                    | 1                        | 60                                | None                                      | None                                 |
| UDREI                       | 2-6, 24                  | 6                                 | 18  | 12                                   |
| Fast Corrections            | 2-5, 24                  | See Table A-8 in RTCA DO-229C     | See Table A-8 in RTCA DO-229C             | See Table A-8 in RTCA DO-229C        |
| Long Term Corrections       | 24, 25                   | 120                               | 360                                       | 240                                  |
| GEO Nav. Data               | 9                        | 120                               | 360                                       | 240                                  |
| Fast Correction Degradation | 7                        | 120                               | 360                                       | 240                                  |
| Weighting Factors           | 8                        | 120                               | 240                                       | 240                                  |
| Degradation Parameters      | 10                       | 120                               | 360                                       | 240                                  |
| Ionospheric Grid Mask       | 18                       | 300                               | None                                      | None                                 |
| Ionospheric Corrections     | 26                       | 300                               | 600                                       | 600                                  |
| UTC Timing Data             | 12                       | 300                               | None                                      | None                                 |
| Almanac Data                | 17                       | 300                               | None                                      | None                                 |

**Table 5-4 WAAS Fast Correction and Degradation Message Rates – AMR**

| Message Type | On Time | Late | Max Late Length (seconds) |
|--------------|---------|------|---------------------------|
| 1            | 105977  | 1    | 154                       |
| 2            | 1310386 | 59   | 14                        |
| 3            | 1310337 | 72   | 12                        |
| 4            | 1311385 | 35   | 11                        |
| 7            | 99006   | 15   | 133                       |
| 9            | 92138   | 0    | 0                         |
| 10           | 98912   | 10   | 133                       |
| 17           | 31371   | 0    | 0                         |

**Table 5-5 WAAS Long Correction Message Rates (Type 24 and 25) - AMR**

| SV | On Time | Late | Max Late Length (seconds) |
|----|---------|------|---------------------------|
| 1  | 49130   | 0    | 0                         |
| 2  | 46889   | 0    | 0                         |
| 3  | 48140   | 0    | 0                         |
| 4  | 46952   | 0    | 0                         |
| 5  | 47575   | 0    | 0                         |
| 6  | 49476   | 0    | 0                         |
| 7  | 46924   | 0    | 0                         |
| 8  | 47021   | 0    | 0                         |
| 9  | 46609   | 0    | 0                         |
| 10 | 48401   | 0    | 0                         |
| 11 | 49785   | 0    | 0                         |
| 12 | 47226   | 0    | 0                         |
| 13 | 46829   | 0    | 0                         |
| 14 | 46777   | 0    | 0                         |
| 15 | 47999   | 0    | 0                         |
| 16 | 47578   | 0    | 0                         |
| 17 | 46747   | 0    | 0                         |
| 18 | 46318   | 0    | 0                         |
| 19 | 48580   | 0    | 0                         |
| 20 | 48529   | 0    | 0                         |
| 21 | 47135   | 0    | 0                         |
| 22 | 46704   | 0    | 0                         |
| 23 | 46853   | 0    | 0                         |
| 24 | 48768   | 0    | 0                         |
| 25 | 48298   | 0    | 0                         |
| 26 | 48166   | 0    | 0                         |
| 27 | 4834    | 0    | 0                         |
| 28 | 47754   | 0    | 0                         |
| 29 | 46745   | 0    | 0                         |
| 31 | 47623   | 0    | 0                         |
| 32 | 47028   | 0    | 0                         |

**Table 5-6 WAAS Ephemeris Covariance Message Rates (Type 28) – AMR**

| <b>SV</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-----------|----------------|-------------|--------------------------------------|
| 1         | 40348          | 0           | 0                                    |
| 2         | 38475          | 0           | 0                                    |
| 3         | 39528          | 0           | 0                                    |
| 4         | 38539          | 0           | 0                                    |
| 5         | 39059          | 0           | 0                                    |
| 6         | 40658          | 0           | 0                                    |
| 7         | 38529          | 0           | 0                                    |
| 8         | 38634          | 0           | 0                                    |
| 9         | 38255          | 0           | 0                                    |
| 10        | 39720          | 0           | 0                                    |
| 11        | 40937          | 3           | 211                                  |
| 12        | 38791          | 0           | 0                                    |
| 13        | 38513          | 0           | 0                                    |
| 14        | 38403          | 0           | 0                                    |
| 15        | 39368          | 0           | 0                                    |
| 16        | 39109          | 0           | 0                                    |
| 17        | 38412          | 0           | 0                                    |
| 18        | 38014          | 0           | 0                                    |
| 19        | 39903          | 0           | 0                                    |
| 20        | 39878          | 0           | 0                                    |
| 21        | 38669          | 0           | 0                                    |
| 22        | 38409          | 0           | 0                                    |
| 23        | 38462          | 0           | 0                                    |
| 24        | 40128          | 0           | 0                                    |
| 25        | 39672          | 0           | 0                                    |
| 26        | 39544          | 0           | 0                                    |
| 27        | 3972           | 0           | 0                                    |
| 28        | 39224          | 0           | 0                                    |
| 29        | 38405          | 0           | 0                                    |
| 31        | 39074          | 0           | 0                                    |
| 32        | 38620          | 0           | 0                                    |
| 133       | 75528          | 0           | 0                                    |
| 135       | 75547          | 0           | 0                                    |
| 138       | 75515          | 0           | 0                                    |

**Table 5-7 WAAS Ionospheric Correction Message Rates (Type 26) – AMR**

| <b>Band</b> | <b>Block</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|--------------|----------------|-------------|--------------------------------------|
| 0           | 0            | 27295          | 10          | 307                                  |
| 0           | 1            | 27295          | 10          | 305                                  |
| 0           | 2            | 27301          | 4           | 307                                  |
| 1           | 0            | 27291          | 10          | 306                                  |
| 1           | 1            | 27288          | 9           | 307                                  |
| 1           | 2            | 27298          | 7           | 306                                  |
| 1           | 3            | 27284          | 5           | 306                                  |
| 1           | 4            | 27294          | 7           | 301                                  |
| 2           | 0            | 27298          | 7           | 306                                  |
| 2           | 1            | 27291          | 14          | 306                                  |
| 2           | 2            | 27283          | 10          | 307                                  |
| 2           | 3            | 27307          | 6           | 306                                  |
| 2           | 4            | 27287          | 10          | 307                                  |
| 3           | 0            | 27287          | 14          | 308                                  |
| 3           | 1            | 27278          | 15          | 306                                  |
| 3           | 2            | 27277          | 12          | 310                                  |
| 9           | 0            | 27298          | 10          | 579                                  |
| 9           | 1            | 27291          | 14          | 307                                  |
| 9           | 2            | 27287          | 14          | 307                                  |
| 9           | 3            | 27295          | 6           | 307                                  |
| 9           | 4            | 27297          | 8           | 306                                  |
| 9           | 5            | 27282          | 7           | 305                                  |
| 9           | 6            | 27295          | 6           | 306                                  |

**Table 5-8 WAAS Ionospheric Mask Message Rates (Type 18) – AMR**

| <b>Band</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|----------------|-------------|--------------------------------------|
| 0           | 35738          | 0           | 0                                    |
| 1           | 35751          | 0           | 0                                    |
| 2           | 35766          | 0           | 0                                    |
| 3           | 35730          | 0           | 0                                    |
| 9           | 35754          | 0           | 0                                    |

**Table 5-9 WAAS Fast Correction and Degradation Message Rates – CRW**

| <b>Message Type</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length (seconds)</b> |
|---------------------|----------------|-------------|----------------------------------|
| 1                   | 105997         | 2           | 127                              |
| 2                   | 1310386        | 58          | 19                               |
| 3                   | 1310335        | 72          | 18                               |
| 4                   | 1311385        | 34          | 17                               |
| 7                   | 99054          | 15          | 133                              |
| 9                   | 92138          | 0           | 0                                |
| 10                  | 99129          | 16          | 132                              |
| 17                  | 31338          | 0           | 0                                |

**Table 5-10 WAAS Long Correction Message Rates (Type 24 and 25) - CRW**

| <b>SV</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length (seconds)</b> |
|-----------|----------------|-------------|----------------------------------|
| 1         | 49132          | 0           | 0                                |
| 2         | 46890          | 0           | 0                                |
| 3         | 48137          | 0           | 0                                |
| 4         | 46945          | 0           | 0                                |
| 5         | 47577          | 0           | 0                                |
| 6         | 49471          | 1           | 164                              |
| 7         | 46929          | 0           | 0                                |
| 8         | 47021          | 0           | 0                                |
| 9         | 46608          | 0           | 0                                |
| 10        | 48400          | 0           | 0                                |
| 11        | 49795          | 0           | 0                                |
| 12        | 47228          | 0           | 0                                |
| 13        | 46832          | 0           | 0                                |
| 14        | 46778          | 1           | 186                              |
| 15        | 47997          | 0           | 0                                |
| 16        | 47583          | 0           | 0                                |
| 17        | 46750          | 0           | 0                                |
| 18        | 46308          | 0           | 0                                |
| 19        | 48589          | 0           | 0                                |
| 20        | 48514          | 0           | 0                                |
| 21        | 47131          | 1           | 164                              |
| 22        | 46704          | 0           | 0                                |
| 23        | 46859          | 1           | 166                              |
| 24        | 48765          | 0           | 0                                |
| 25        | 48300          | 0           | 0                                |
| 26        | 48181          | 0           | 0                                |
| 27        | 4835           | 0           | 0                                |
| 28        | 47743          | 0           | 0                                |
| 29        | 46741          | 1           | 186                              |
| 31        | 47624          | 0           | 0                                |
| 32        | 47044          | 0           | 0                                |

**Table 5-11 WAAS Ephemeris Covariance Message Rates (Type 28) – CRW**

| <b>SV</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-----------|----------------|-------------|--------------------------------------|
| 1         | 40348          | 0           | 0                                    |
| 2         | 38475          | 0           | 0                                    |
| 3         | 39528          | 0           | 0                                    |
| 4         | 38539          | 0           | 0                                    |
| 5         | 39059          | 0           | 0                                    |
| 6         | 40656          | 1           | 210                                  |
| 7         | 38529          | 0           | 0                                    |
| 8         | 38634          | 0           | 0                                    |
| 9         | 38255          | 0           | 0                                    |
| 10        | 39720          | 0           | 0                                    |
| 11        | 40935          | 4           | 211                                  |
| 12        | 38791          | 0           | 0                                    |
| 13        | 38513          | 0           | 0                                    |
| 14        | 38403          | 0           | 0                                    |
| 15        | 39368          | 0           | 0                                    |
| 16        | 39109          | 0           | 0                                    |
| 17        | 38412          | 0           | 0                                    |
| 18        | 38014          | 0           | 0                                    |
| 19        | 39903          | 0           | 0                                    |
| 20        | 39878          | 0           | 0                                    |
| 21        | 38669          | 0           | 0                                    |
| 22        | 38409          | 0           | 0                                    |
| 23        | 38462          | 0           | 0                                    |
| 24        | 40128          | 0           | 0                                    |
| 25        | 39672          | 0           | 0                                    |
| 26        | 39544          | 0           | 0                                    |
| 27        | 3972           | 0           | 0                                    |
| 28        | 39224          | 0           | 0                                    |
| 29        | 38405          | 0           | 0                                    |
| 31        | 39074          | 0           | 0                                    |
| 32        | 38618          | 1           | 210                                  |
| 133       | 75528          | 0           | 0                                    |
| 135       | 75547          | 0           | 0                                    |
| 138       | 75513          | 1           | 210                                  |

**Table 5-12 WAAS Ionospheric Correction Message Rates (Type 26) – CRW**

| <b>Band</b> | <b>Block</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|--------------|----------------|-------------|--------------------------------------|
| 0           | 0            | 27283          | 13          | 306                                  |
| 0           | 1            | 27287          | 13          | 307                                  |
| 0           | 2            | 27276          | 12          | 306                                  |
| 1           | 0            | 27292          | 12          | 306                                  |
| 1           | 1            | 27297          | 11          | 307                                  |
| 1           | 2            | 27291          | 9           | 307                                  |
| 1           | 3            | 27291          | 9           | 307                                  |
| 1           | 4            | 27293          | 11          | 311                                  |
| 2           | 0            | 27293          | 7           | 307                                  |
| 2           | 1            | 27295          | 10          | 307                                  |
| 2           | 2            | 27289          | 8           | 306                                  |
| 2           | 3            | 27297          | 8           | 306                                  |
| 2           | 4            | 27288          | 9           | 306                                  |
| 3           | 0            | 27287          | 10          | 312                                  |
| 3           | 1            | 27282          | 15          | 305                                  |
| 3           | 2            | 27295          | 6           | 307                                  |
| 9           | 0            | 27285          | 16          | 307                                  |
| 9           | 1            | 27283          | 14          | 306                                  |
| 9           | 2            | 27293          | 11          | 306                                  |
| 9           | 3            | 27282          | 10          | 306                                  |
| 9           | 4            | 27290          | 14          | 307                                  |
| 9           | 5            | 27287          | 13          | 306                                  |
| 9           | 6            | 27293          | 11          | 306                                  |

**Table 5-13 WAAS Ionospheric Mask Message Rates (Type 18) - CRW**

| <b>Band</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|----------------|-------------|--------------------------------------|
| 0           | 35784          | 0           | 0                                    |
| 1           | 35735          | 0           | 0                                    |
| 2           | 35727          | 0           | 0                                    |
| 3           | 35727          | 0           | 0                                    |
| 9           | 35743          | 0           | 0                                    |

**Table 5-14 WAAS Fast Correction and Degradation Message Rates – CRE**

| <b>Message Type</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length (seconds)</b> |
|---------------------|----------------|-------------|----------------------------------|
| 1                   | 105257         | 1           | 127                              |
| 2                   | 1310386        | 58          | 16                               |
| 3                   | 1310334        | 72          | 18                               |
| 4                   | 1311375        | 37          | 17                               |
| 7                   | 98330          | 21          | 148                              |
| 9                   | 92136          | 1           | 170                              |
| 10                  | 98387          | 19          | 137                              |
| 17                  | 31302          | 2           | 304                              |

**Table 5-15 WAAS Long Correction Message Rates (Type 24 and 25) – CRE**

| <b>SV</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length (seconds)</b> |
|-----------|----------------|-------------|----------------------------------|
| 1         | 49136          | 0           | 0                                |
| 2         | 46884          | 0           | 0                                |
| 3         | 48138          | 0           | 0                                |
| 4         | 46948          | 0           | 0                                |
| 5         | 47558          | 0           | 0                                |
| 6         | 49471          | 0           | 0                                |
| 7         | 46918          | 0           | 0                                |
| 8         | 47019          | 0           | 0                                |
| 9         | 46605          | 0           | 0                                |
| 10        | 48409          | 0           | 0                                |
| 11        | 49795          | 0           | 0                                |
| 12        | 47228          | 1           | 167                              |
| 13        | 46832          | 0           | 0                                |
| 14        | 46780          | 0           | 0                                |
| 15        | 48003          | 0           | 0                                |
| 16        | 47577          | 1           | 172                              |
| 17        | 46750          | 0           | 0                                |
| 18        | 46315          | 0           | 0                                |
| 19        | 48587          | 0           | 0                                |
| 20        | 48524          | 0           | 0                                |
| 21        | 47129          | 0           | 0                                |
| 22        | 46706          | 0           | 0                                |
| 23        | 46849          | 0           | 0                                |
| 24        | 48767          | 0           | 0                                |
| 25        | 48302          | 0           | 0                                |
| 26        | 48192          | 0           | 0                                |
| 27        | 4833           | 0           | 0                                |
| 28        | 47758          | 1           | 167                              |
| 29        | 46744          | 0           | 0                                |
| 31        | 47630          | 0           | 0                                |
| 32        | 47032          | 0           | 0                                |

**Table 5-16 WAAS Ephemeris Covariance Message Rates (Type 28) – CRE**

| <b>SV</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-----------|----------------|-------------|--------------------------------------|
| 1         | 40370          | 0           | 0                                    |
| 2         | 38476          | 0           | 0                                    |
| 3         | 39529          | 0           | 0                                    |
| 4         | 38547          | 1           | 177                                  |
| 5         | 39049          | 0           | 0                                    |
| 6         | 40637          | 0           | 0                                    |
| 7         | 38519          | 0           | 0                                    |
| 8         | 38644          | 0           | 0                                    |
| 9         | 38262          | 0           | 0                                    |
| 10        | 39725          | 0           | 0                                    |
| 11        | 40948          | 1           | 151                                  |
| 12        | 38772          | 0           | 0                                    |
| 13        | 38485          | 0           | 0                                    |
| 14        | 38394          | 0           | 0                                    |
| 15        | 39380          | 0           | 0                                    |
| 16        | 39101          | 0           | 0                                    |
| 17        | 38425          | 1           | 210                                  |
| 18        | 38024          | 0           | 0                                    |
| 19        | 39912          | 0           | 0                                    |
| 20        | 39868          | 0           | 0                                    |
| 21        | 38667          | 0           | 0                                    |
| 22        | 38415          | 0           | 0                                    |
| 23        | 38480          | 0           | 0                                    |
| 24        | 40136          | 0           | 0                                    |
| 25        | 39651          | 1           | 210                                  |
| 26        | 39516          | 0           | 0                                    |
| 27        | 3976           | 0           | 0                                    |
| 28        | 39190          | 0           | 0                                    |
| 29        | 38415          | 0           | 0                                    |
| 31        | 39074          | 0           | 0                                    |
| 32        | 38600          | 0           | 0                                    |
| 133       | 75568          | 1           | 209                                  |
| 135       | 75565          | 0           | 0                                    |
| 138       | 75499          | 0           | 0                                    |

**Table 5-17 WAAS Ionospheric Correction Message Rates (Type 26) – CRE**

| <b>Band</b> | <b>Block</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|--------------|----------------|-------------|--------------------------------------|
| 0           | 0            | 27286          | 14          | 308                                  |
| 0           | 1            | 27282          | 13          | 306                                  |
| 0           | 2            | 27294          | 9           | 306                                  |
| 1           | 0            | 27291          | 8           | 306                                  |
| 1           | 1            | 27298          | 10          | 306                                  |
| 1           | 2            | 27283          | 9           | 302                                  |
| 1           | 3            | 27297          | 11          | 306                                  |
| 1           | 4            | 27287          | 9           | 305                                  |
| 2           | 0            | 27287          | 17          | 306                                  |
| 2           | 1            | 27279          | 13          | 306                                  |
| 2           | 2            | 27288          | 8           | 305                                  |
| 2           | 3            | 27288          | 16          | 306                                  |
| 2           | 4            | 27292          | 12          | 305                                  |
| 3           | 0            | 27286          | 14          | 306                                  |
| 3           | 1            | 27282          | 10          | 307                                  |
| 3           | 2            | 27280          | 11          | 576                                  |
| 9           | 0            | 27303          | 9           | 306                                  |
| 9           | 1            | 27279          | 12          | 579                                  |
| 9           | 2            | 27286          | 10          | 306                                  |
| 9           | 3            | 27299          | 9           | 310                                  |
| 9           | 4            | 27283          | 13          | 307                                  |
| 9           | 5            | 27292          | 12          | 306                                  |
| 9           | 6            | 27284          | 12          | 306                                  |

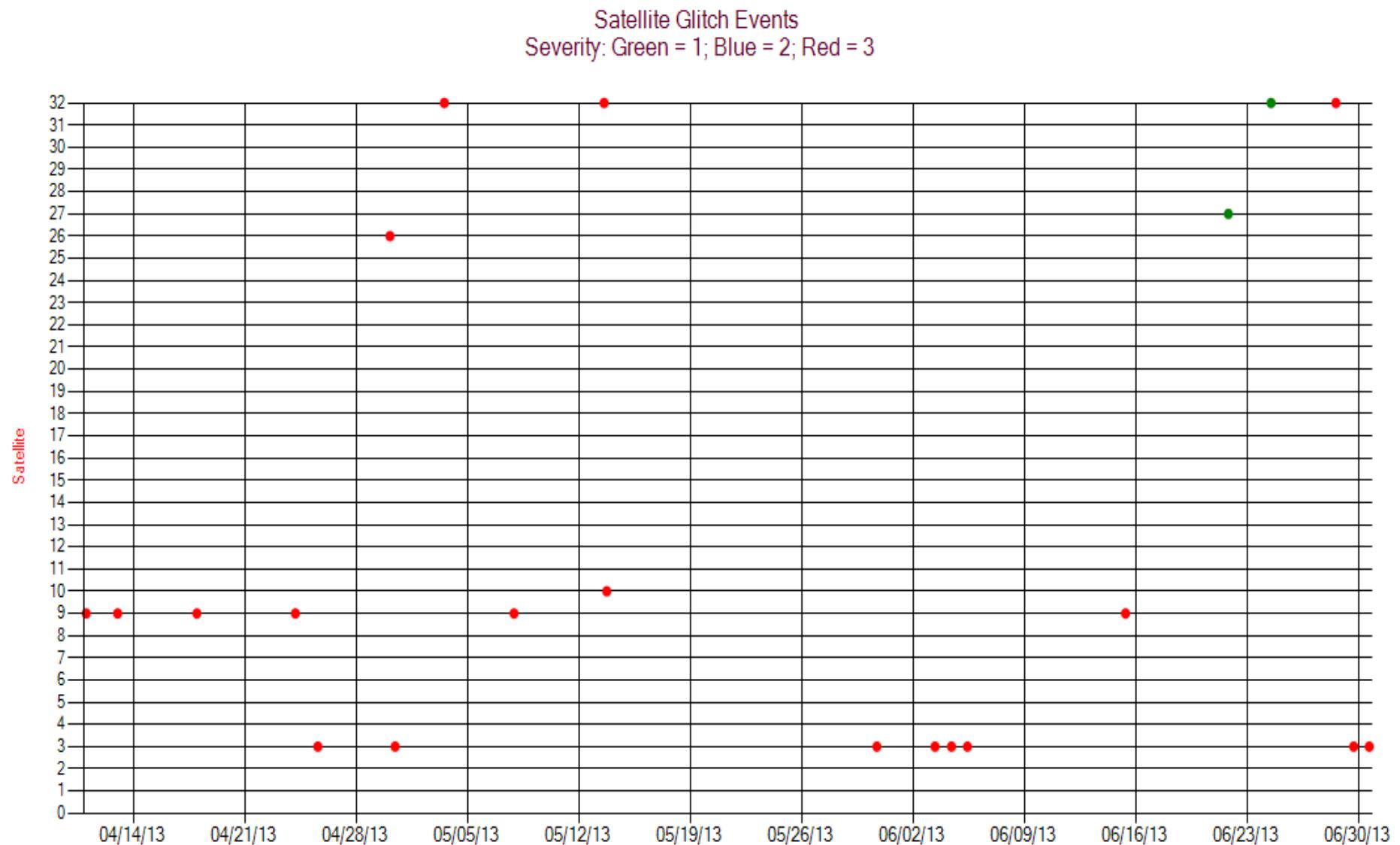
**Table 5-18 WAAS Ionospheric Mask Message Rates (Type 18) – CRE**

| <b>Band</b> | <b>On Time</b> | <b>Late</b> | <b>Max Late Length<br/>(seconds)</b> |
|-------------|----------------|-------------|--------------------------------------|
| 0           | 35683          | 0           | 0                                    |
| 1           | 35637          | 0           | 0                                    |
| 2           | 35654          | 0           | 0                                    |
| 3           | 35626          | 0           | 0                                    |
| 9           | 35669          | 0           | 0                                    |

#### 5.4 Satellite Glitches

The GPS satellites occasionally have periods of signal carrier stability ‘glitches’ of varying magnitude. These are short degradations in the signal that in severe cases cause WAAS to lose track or cycle slip for some or all of the WAAS receivers. The more severe glitches will cause the WAAS reported UDRE spike to ‘Not Monitor’ and result in an alert.

Figure 5-2 shows the satellite glitches visible to WAAS for the quarter. Glitches are categorized into three severity levels. Severity one glitches cause a significant number of the receivers to simultaneously have bad subframe parity, but not all receivers. Severity two glitches cause all of the receivers to report bad subframe parity data and some receivers to also have cycle slips and or lose tracking of L2 and or L1. Severity three glitches cause all of the receivers to lose track of both L1 and L2 data.

**Figure 5-2 SV Glitch Trend**

## 6.0 SV RANGE ACCURACY

Range accuracy evaluation computes the probability that the WAAS User Differential Range Error (UDRE) and Grid Ionospheric Vertical Error (GIVE) statistically bound 99.9% of the range residuals for each satellite tracked by the receiver. A UDRE is broadcast by the WAAS for each satellite that is monitored by the system and the 99.9% bound (3.29 sigma) of the residual error on a pseudorange after application of fast and long-term corrections is checked. The pseudorange residual error is determined by taking the difference between the raw pseudorange and a calculated reference range. The reference range is equal to the true range between the corrected satellite position and surveyed user antenna plus all corrections (WAAS Fast Clock, WAAS Long-Term Clock, WAAS Ionospheric delay, Tropospheric delay, Receiver Clock Bias, and Multipath). Since the true ionospheric delay and multipath error are not precisely known, the estimated variance in these error sources are added to the UDRE before the comparing it to the residual error.

GPS satellite range residual errors were calculated for twelve WAAS receivers during the quarter. Table 6-1 and 6-2 show the range error 95% index and 99.9% (3.29 sigma) bounding statistics for each SV at the selected locations. Figures 6-1 to 6-2 show the range error for each SV as measured by the WAAS receivers at the Washington DC reference station.

A GIVE is broadcast by the WAAS for each IGP that is monitored by the system and the 99.9% (3.29 sigma) bound of the ionospheric error is checked. The WAAS broadcasts the ionospheric model using IGP's at predefined geographic locations. Each IGP contains the vertical ionospheric delay and the error in that delay in the form of the GIVE. The ionospheric error is determined by taking the difference between the WAAS vertical ionospheric delay interpolated from the IGP's and GPS dual frequency measurement at that GPS satellite.

GPS satellite ionospheric errors were calculated for twelve WAAS receivers during the quarter. Table 6-3 and 6-4 show the ionospheric error 95% index and 99.9% (3.29 sigma) bounding statistics for each SV at the selected locations. Figures 6-3 to 6-4 show the ionospheric error for each SV as measured by the WAAS receiver at the Washington DC reference station.

For this reporting period, most satellites range errors were bounded 99.9% of the time by UDRE. The unbounded range errors on PRN-19, PRN-20, PRN-23, and PRN-25 were due to geomagnetic activity. All other unbounded errors were due to noise and multipath.

**Table 6-1 Range Error 95% index and 3.29 Sigma Bounding**

| <b>Site →</b> | <b>Billings</b> |                        | <b>Albuquerque</b> |                        | <b>Boston</b>   |                        | <b>Washington DC</b> |                        | <b>Houston</b>  |                        | <b>Kansas City</b> |                        |
|---------------|-----------------|------------------------|--------------------|------------------------|-----------------|------------------------|----------------------|------------------------|-----------------|------------------------|--------------------|------------------------|
| SV ↓          | 95% Range Error | 3.29 Sigma Bounding(%) | 95% Range Error    | 3.29 Sigma Bounding(%) | 95% Range Error | 3.29 Sigma Bounding(%) | 95% Range Error      | 3.29 Sigma Bounding(%) | 95% Range Error | 3.29 Sigma Bounding(%) | 95% Range Error    | 3.29 Sigma Bounding(%) |
| 1             | 2.905           | 100                    | 2.905              | 100                    | 2.689           | 100                    | 2.011                | 100                    | 2.288           | 100                    | 2.232              | 100                    |
| 2             | 1.836           | 100                    | 1.836              | 100                    | 1.066           | 100                    | 1.490                | 100                    | 2.800           | 100                    | 1.697              | 100                    |
| 3             | 1.167           | 100                    | 1.167              | 100                    | 1.437           | 100                    | 1.459                | 100                    | 1.291           | 100                    | 0.927              | 100                    |
| 4             | 0.976           | 100                    | 0.976              | 100                    | 1.627           | 100                    | 1.181                | 100                    | 1.247           | 100                    | 1.420              | 100                    |
| 5             | 1.576           | 100                    | 1.576              | 100                    | 1.832           | 100                    | 1.296                | 100                    | 0.954           | 100                    | 1.625              | 100                    |
| 6             | 1.224           | 100                    | 1.224              | 100                    | 1.674           | 100                    | 1.185                | 100                    | 1.158           | 100                    | 1.155              | 100                    |
| 7             | 0.931           | 100                    | 0.931              | 100                    | 1.649           | 100                    | 1.031                | 100                    | 1.098           | 100                    | 1.032              | 100                    |
| 8             | 0.859           | 100                    | 0.859              | 100                    | 1.577           | 100                    | 1.206                | 100                    | 1.335           | 100                    | 1.328              | 100                    |
| 9             | 1.183           | 100                    | 1.183              | 100                    | 1.442           | 100                    | 1.212                | 100                    | 1.638           | 100                    | 1.220              | 100                    |
| 10            | 1.216           | 100                    | 1.216              | 100                    | 1.208           | 100                    | 1.343                | 100                    | 1.937           | 100                    | 1.430              | 100                    |
| 11            | 1.049           | 100                    | 1.049              | 100                    | 0.963           | 100                    | 1.329                | 100                    | 2.038           | 100                    | 0.896              | 100                    |
| 12            | 1.069           | 100                    | 1.069              | 100                    | 1.602           | 100                    | 1.028                | 100                    | 1.197           | 100                    | 1.468              | 100                    |
| 13            | 1.528           | 100                    | 1.528              | 100                    | 1.325           | 100                    | 1.063                | 100                    | 1.057           | 100                    | 1.332              | 100                    |
| 14            | 0.698           | 100                    | 0.698              | 100                    | 1.578           | 100                    | 1.032                | 100                    | 1.419           | 100                    | 1.504              | 100                    |
| 15            | 1.221           | 100                    | 1.221              | 100                    | 1.874           | 100                    | 1.212                | 100                    | 1.510           | 100                    | 1.459              | 100                    |
| 16            | 0.925           | 100                    | 0.925              | 100                    | 1.219           | 100                    | 1.160                | 100                    | 1.709           | 100                    | 1.283              | 100                    |
| 17            | 0.733           | 100                    | 0.733              | 100                    | 1.676           | 100                    | 0.805                | 100                    | 1.652           | 100                    | 1.456              | 100                    |
| 18            | 1.099           | 100                    | 1.099              | 100                    | 0.940           | 100                    | 1.267                | 100                    | 1.630           | 100                    | 1.226              | 100                    |
| 19            | 1.986           | 100                    | 1.986              | 100                    | 2.452           | 100                    | 2.779                | 100                    | 2.704           | 100                    | 2.385              | 100                    |
| 20            | 1.838           | 100                    | 1.838              | 100                    | 1.251           | 100                    | 1.529                | 100                    | 1.653           | 100                    | 1.149              | 100                    |
| 21            | 1.382           | 100                    | 1.382              | 100                    | 1.254           | 100                    | 1.689                | 100                    | 1.887           | 100                    | 1.664              | 100                    |
| 22            | 2.034           | 100                    | 2.034              | 100                    | 2.268           | 100                    | 2.489                | 100                    | 2.480           | 100                    | 1.959              | 100                    |
| 23            | 1.699           | 100                    | 1.699              | 100                    | 2.518           | 100                    | 1.865                | 100                    | 2.739           | 100                    | 1.783              | 100                    |
| 24            | 2.870           | 100                    | 2.870              | 100                    | 3.062           | 100                    | 2.627                | 100                    | 3.247           | 99.9998                | 2.984              | 100                    |
| 25            | 2.124           | 100                    | 2.124              | 100                    | 2.394           | 100                    | 2.235                | 100                    | 2.680           | 100                    | 2.421              | 100                    |
| 26            | 1.114           | 100                    | 1.114              | 100                    | 1.917           | 100                    | 1.108                | 100                    | 1.009           | 100                    | 1.338              | 100                    |
| 27            | 1.626           | 100                    | 1.626              | 100                    | 2.373           | 100                    | 1.636                | 100                    | 1.623           | 100                    | 1.790              | 100                    |
| 28            | 1.267           | 100                    | 1.267              | 100                    | 1.071           | 100                    | 1.389                | 100                    | 2.105           | 100                    | 1.145              | 100                    |
| 29            | 1.780           | 100                    | 1.780              | 100                    | 1.545           | 100                    | 1.438                | 100                    | 1.182           | 100                    | 1.402              | 100                    |
| 30            | -               | -                      | -                  | -                      | -               | -                      | -                    | -                      | -               | -                      | -                  | -                      |
| 31            | 1.058           | 100                    | 1.058              | 100                    | 0.813           | 100                    | 0.734                | 100                    | 1.251           | 100                    | 2.257              | 100                    |
| 32            | 0.990           | 100                    | 0.990              | 100                    | 1.044           | 100                    | 0.898                | 100                    | 1.217           | 100                    | 1.211              | 100                    |
| 135           | 1.993           | 100                    | 1.993              | 100                    | 3.388           | 100                    | 1.651                | 100                    | 1.961           | 100                    | 1.338              | 100                    |
| 138           | 1.325           | 100                    | 1.325              | 100                    | 1.321           | 100                    | 1.587                | 100                    | 1.841           | 100                    | 1.820              | 100                    |

Table 6-2 Range Error 95% index and 3.29 Sigma Bounding

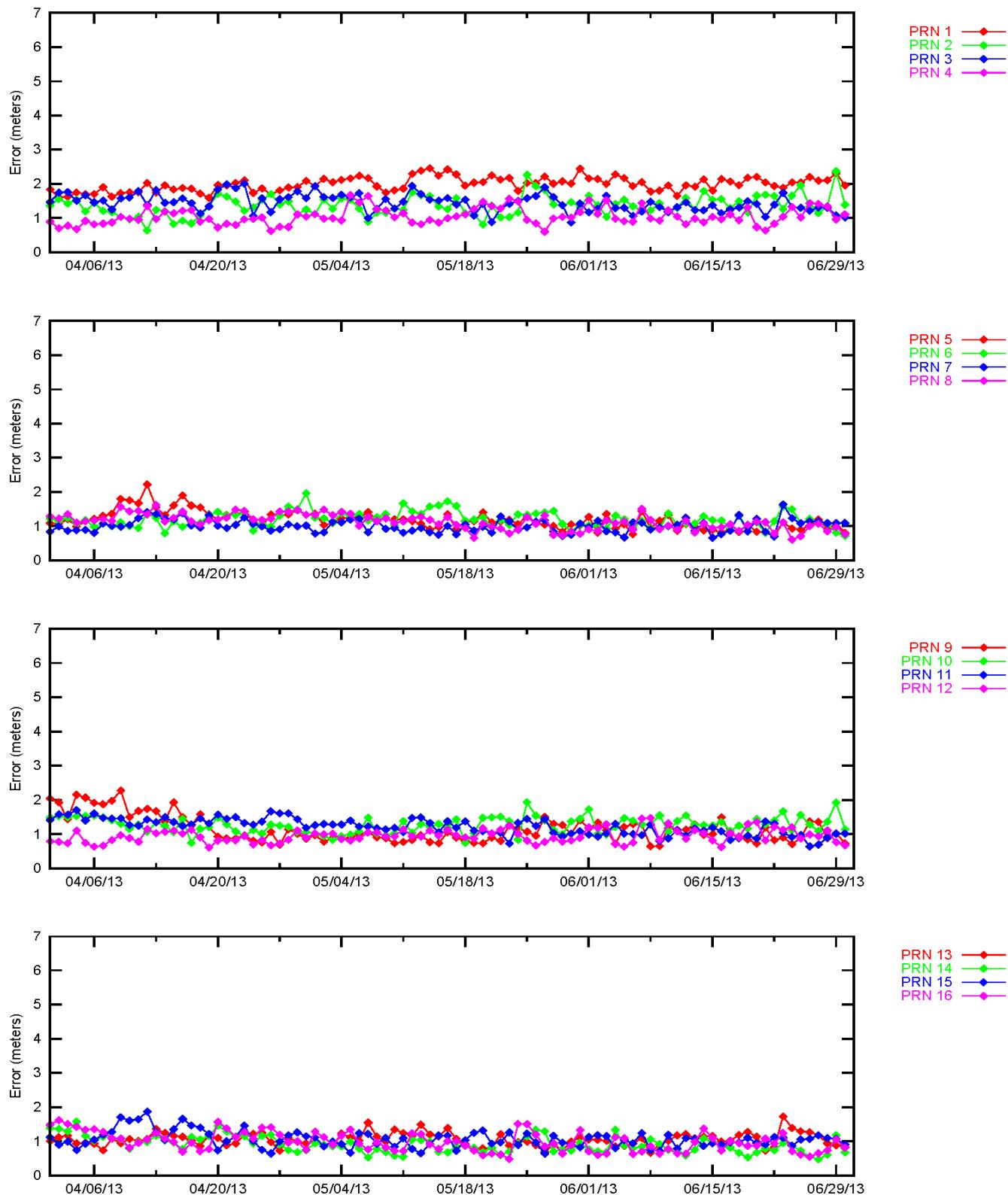
| Site → | Los Angeles     |                        | Salt Lake City  |                        | Miami           |                        | Minneapolis     |                        | Atlanta         |                        | Juneau          |                        |
|--------|-----------------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|------------------------|
| SV ↓   | 95% Range Error | 3.29 Sigma Bounding(%) |
| 1      | 2.090           | 100                    | 2.775           | 100                    | 2.236           | 100                    | 3.416           | 100                    | 2.096           | 100                    | 2.575           | 100                    |
| 2      | 1.994           | 100                    | 1.511           | 100                    | 2.202           | 100                    | 1.440           | 100                    | 1.633           | 100                    | 2.290           | 100                    |
| 3      | 1.782           | 100                    | 1.120           | 100                    | 0.970           | 100                    | 1.261           | 100                    | 0.892           | 100                    | 1.589           | 100                    |
| 4      | 1.632           | 100                    | 1.847           | 100                    | 1.653           | 100                    | 1.394           | 100                    | 1.139           | 100                    | 1.734           | 100                    |
| 5      | 1.210           | 100                    | 1.522           | 100                    | 1.343           | 100                    | 1.730           | 100                    | 1.223           | 100                    | 1.845           | 100                    |
| 6      | 0.942           | 100                    | 1.752           | 100                    | 0.997           | 100                    | 1.317           | 100                    | 1.166           | 100                    | 1.931           | 100                    |
| 7      | 1.003           | 100                    | 1.146           | 100                    | 1.708           | 100                    | 1.258           | 100                    | 0.922           | 100                    | 1.817           | 100                    |
| 8      | 0.835           | 100                    | 0.989           | 100                    | 0.950           | 100                    | 1.174           | 100                    | 0.866           | 100                    | 1.839           | 100                    |
| 9      | 1.070           | 100                    | 1.493           | 100                    | 1.125           | 100                    | 1.213           | 100                    | 1.024           | 100                    | 1.782           | 100                    |
| 10     | 1.123           | 100                    | 0.882           | 100                    | 1.562           | 100                    | 0.801           | 100                    | 1.122           | 100                    | 1.741           | 100                    |
| 11     | 1.336           | 100                    | 1.226           | 100                    | 1.976           | 100                    | 1.011           | 100                    | 1.423           | 100                    | 2.034           | 100                    |
| 12     | 0.878           | 100                    | 1.213           | 100                    | 1.250           | 100                    | 1.594           | 100                    | 1.004           | 100                    | 1.589           | 100                    |
| 13     | 0.903           | 100                    | 1.889           | 100                    | 1.189           | 100                    | 1.381           | 100                    | 0.875           | 100                    | 1.597           | 100                    |
| 14     | 1.382           | 100                    | 1.127           | 100                    | 1.207           | 100                    | 0.726           | 100                    | 0.875           | 100                    | 1.789           | 100                    |
| 15     | 1.154           | 100                    | 1.394           | 100                    | 1.342           | 100                    | 1.715           | 100                    | 1.113           | 100                    | 1.763           | 100                    |
| 16     | 1.401           | 100                    | 1.078           | 100                    | 1.376           | 100                    | 1.053           | 100                    | 1.334           | 100                    | 1.968           | 100                    |
| 17     | 0.868           | 100                    | 1.116           | 100                    | 1.293           | 100                    | 0.984           | 100                    | 0.862           | 100                    | 1.505           | 100                    |
| 18     | 1.519           | 100                    | 1.646           | 100                    | 1.194           | 100                    | 1.053           | 100                    | 1.392           | 100                    | 2.083           | 100                    |
| 19     | 2.212           | 100                    | 2.060           | 100                    | 2.361           | 100                    | 1.853           | 100                    | 2.745           | 100                    | 3.010           | 99.8286                |
| 20     | 1.400           | 100                    | 1.282           | 100                    | 1.528           | 100                    | 1.345           | 100                    | 1.378           | 100                    | 2.304           | 99.9587                |
| 21     | 1.581           | 100                    | 1.030           | 100                    | 2.196           | 100                    | 1.052           | 100                    | 1.345           | 100                    | 2.004           | 100                    |
| 22     | 2.472           | 100                    | 2.014           | 100                    | 2.574           | 100                    | 2.010           | 100                    | 2.317           | 100                    | 3.113           | 99.9531                |
| 23     | 2.162           | 100                    | 1.646           | 100                    | 2.104           | 100                    | 1.476           | 100                    | 2.035           | 100                    | 2.633           | 99.9691                |
| 24     | 2.392           | 100                    | 3.465           | 99.6142                | 2.688           | 100                    | 2.758           | 100                    | 2.642           | 100                    | 3.150           | 100                    |
| 25     | 2.210           | 100                    | 2.242           | 100                    | 2.351           | 100                    | 2.486           | 99.9958                | 2.106           | 100                    | 2.691           | 99.9960                |
| 26     | 1.331           | 100                    | 1.305           | 100                    | 1.144           | 100                    | 1.575           | 100                    | 1.054           | 100                    | 1.745           | 100                    |
| 27     | 1.823           | 100                    | 1.902           | 100                    | 1.657           | 100                    | 2.065           | 100                    | 1.770           | 100                    | 2.232           | 100                    |
| 28     | 1.428           | 100                    | 1.352           | 100                    | 2.277           | 100                    | 1.103           | 99.9662                | 1.426           | 100                    | 2.260           | 100                    |
| 29     | 0.963           | 100                    | 1.944           | 100                    | 1.747           | 100                    | 1.585           | 100                    | 1.168           | 100                    | 1.897           | 100                    |
| 30     | -               | -                      | -               | -                      | -               | -                      | -               | -                      | -               | -                      | -               | -                      |
| 31     | 1.009           | 100                    | 1.095           | 100                    | 1.764           | 100                    | 0.839           | 100                    | 0.688           | 100                    | 1.733           | 100                    |
| 32     | 0.908           | 100                    | 1.375           | 100                    | 1.252           | 100                    | 0.900           | 100                    | 0.770           | 100                    | 1.651           | 100                    |
| 135    | 1.898           | 100                    | 1.813           | 100                    | 1.387           | 100                    | 1.962           | 100                    | 1.777           | 100                    | 1.581           | 100                    |
| 138    | 2.627           | 100                    | 1.558           | 100                    | 2.046           | 100                    | 1.839           | 100                    | 1.245           | 100                    | 1.489           | 100                    |

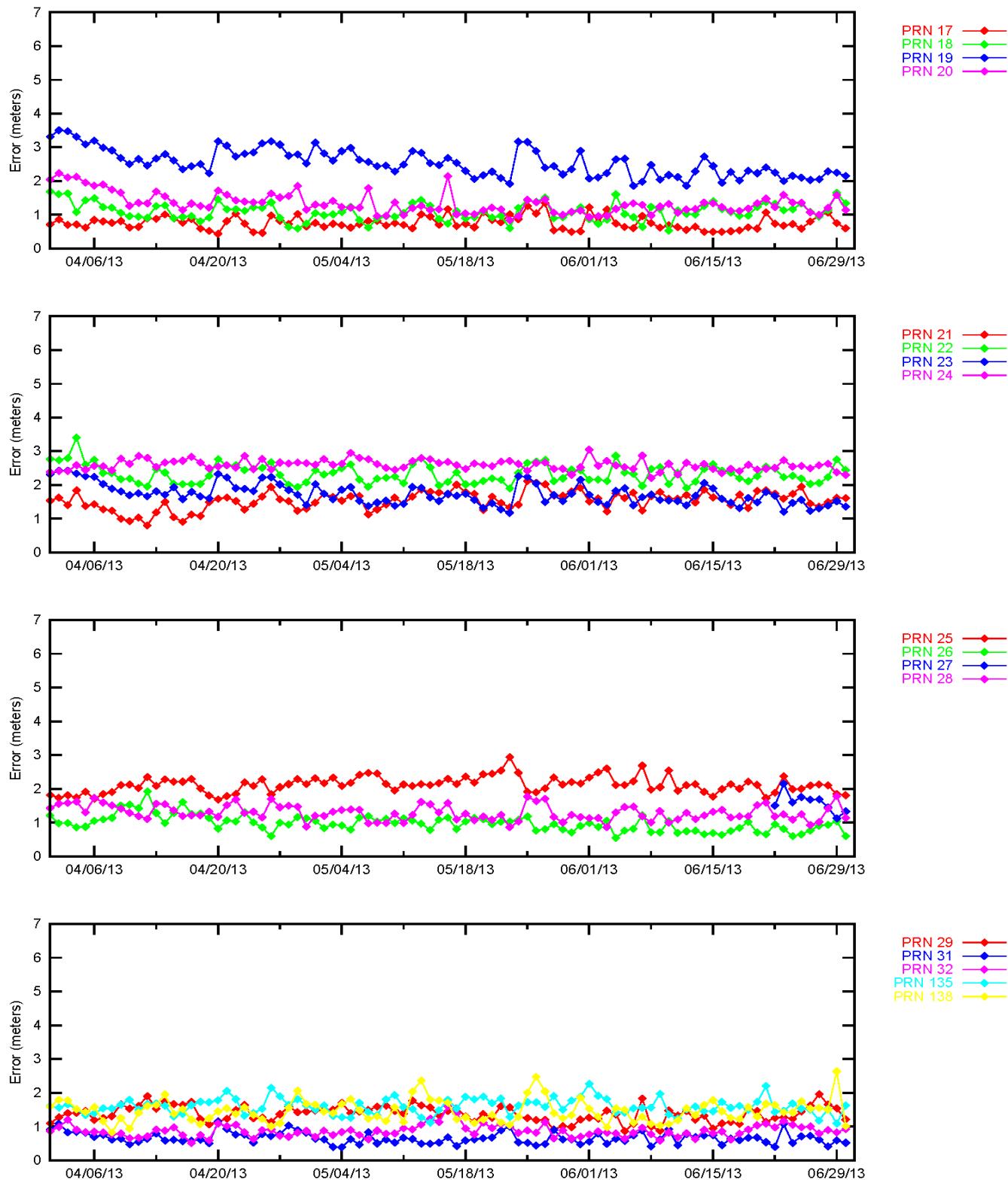
**Table 6-3 Ionospheric Error 95% index and 3.29 Sigma Bounding**

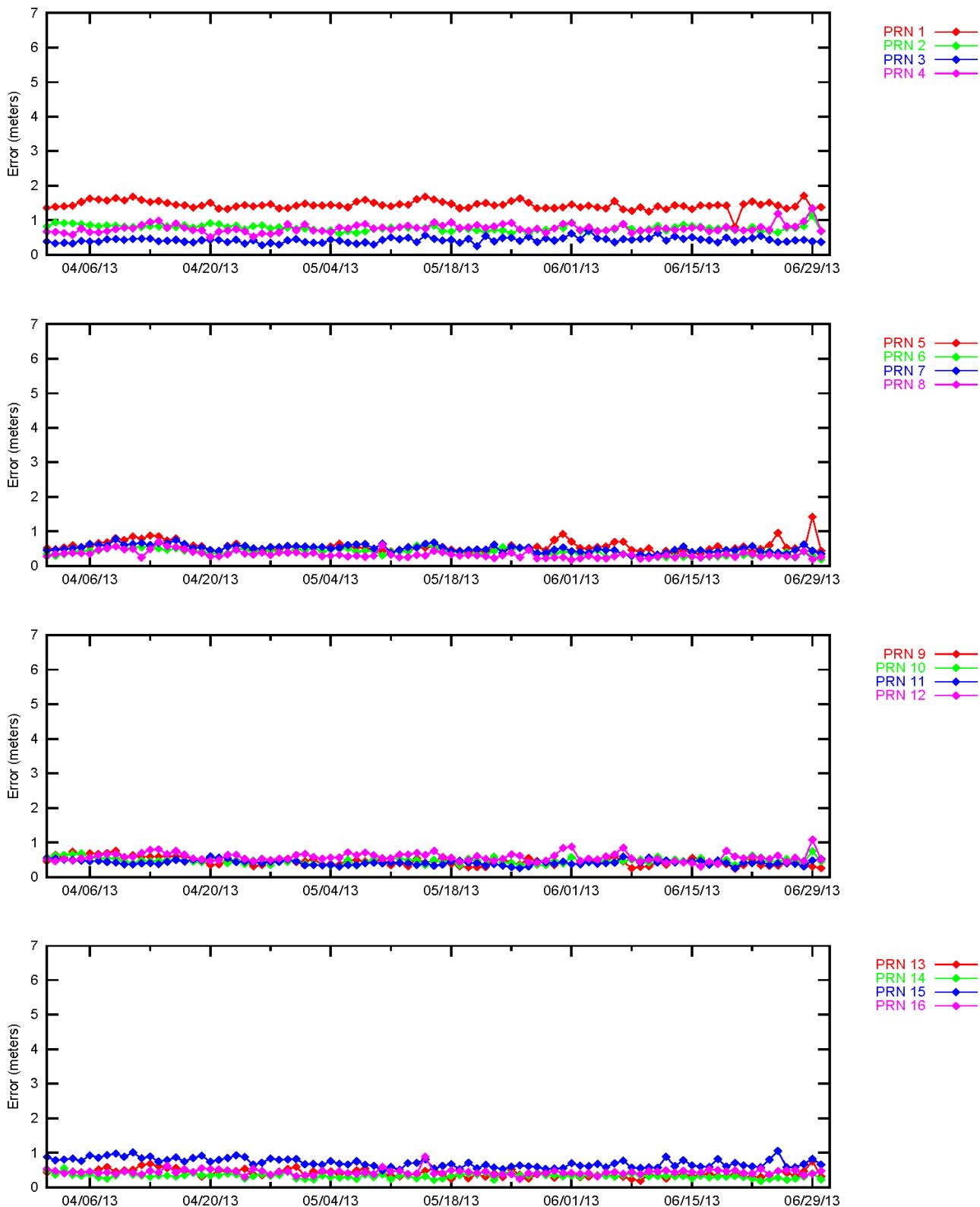
| <b>Site →</b> | <b>Billings</b>       |                               | <b>Albuquerque</b>    |                               | <b>Boston</b>         |                               | <b>Washington DC</b>  |                               | <b>Houston</b>        |                               | <b>Kansas City</b>    |                               |
|---------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|
| <b>SV ↓</b>   | <b>95% Iono Error</b> | <b>3.29 Sigma Bounding(%)</b> |
| 1             | 1.555                 | 100                           | 1.842                 | 100                           | 1.809                 | 100                           | 1.399                 | 100                           | 1.440                 | 100                           | 1.475                 | 100                           |
| 2             | 1.139                 | 100                           | 0.827                 | 100                           | 0.736                 | 100                           | 0.837                 | 100                           | 1.423                 | 100                           | 0.966                 | 100                           |
| 3             | 0.447                 | 100                           | 0.755                 | 100                           | 0.715                 | 100                           | 0.664                 | 100                           | 0.838                 | 100                           | 0.452                 | 100                           |
| 4             | 1.837                 | 100                           | 1.114                 | 100                           | 1.039                 | 100                           | 1.038                 | 100                           | 1.397                 | 100                           | 0.957                 | 100                           |
| 5             | 1.382                 | 100                           | 1.111                 | 100                           | 1.212                 | 100                           | 0.672                 | 100                           | 1.096                 | 100                           | 1.158                 | 100                           |
| 6             | 0.745                 | 100                           | 0.794                 | 100                           | 0.856                 | 100                           | 0.457                 | 100                           | 0.714                 | 100                           | 0.613                 | 100                           |
| 7             | 0.668                 | 100                           | 0.701                 | 100                           | 0.769                 | 100                           | 0.669                 | 100                           | 0.667                 | 100                           | 0.691                 | 100                           |
| 8             | 0.489                 | 100                           | 0.578                 | 100                           | 0.769                 | 100                           | 0.534                 | 100                           | 0.532                 | 100                           | 0.766                 | 100                           |
| 9             | 0.679                 | 100                           | 0.697                 | 100                           | 0.693                 | 100                           | 0.553                 | 100                           | 0.540                 | 100                           | 0.595                 | 100                           |
| 10            | 0.509                 | 100                           | 0.415                 | 100                           | 0.546                 | 100                           | 0.484                 | 100                           | 1.102                 | 100                           | 0.553                 | 100                           |
| 11            | 0.584                 | 100                           | 0.391                 | 100                           | 0.433                 | 100                           | 0.416                 | 100                           | 0.934                 | 100                           | 0.340                 | 100                           |
| 12            | 0.730                 | 100                           | 0.789                 | 100                           | 0.847                 | 100                           | 0.648                 | 100                           | 0.578                 | 100                           | 0.671                 | 100                           |
| 13            | 0.511                 | 100                           | 0.895                 | 100                           | 0.674                 | 100                           | 0.594                 | 100                           | 0.710                 | 100                           | 0.574                 | 100                           |
| 14            | 0.830                 | 100                           | 0.534                 | 100                           | 0.804                 | 100                           | 0.432                 | 100                           | 0.802                 | 100                           | 0.728                 | 100                           |
| 15            | 0.595                 | 100                           | 0.859                 | 100                           | 0.914                 | 100                           | 0.792                 | 100                           | 1.150                 | 100                           | 0.791                 | 100                           |
| 16            | 0.816                 | 100                           | 0.491                 | 100                           | 0.462                 | 100                           | 0.516                 | 100                           | 0.810                 | 100                           | 0.844                 | 100                           |
| 17            | 1.654                 | 100                           | 0.918                 | 100                           | 1.263                 | 100                           | 0.584                 | 100                           | 0.628                 | 100                           | 0.656                 | 100                           |
| 18            | 0.783                 | 100                           | 0.513                 | 100                           | 0.566                 | 100                           | 0.814                 | 100                           | 0.782                 | 100                           | 0.585                 | 100                           |
| 19            | 1.481                 | 100                           | 1.287                 | 100                           | 1.277                 | 100                           | 1.447                 | 100                           | 1.799                 | 100                           | 1.467                 | 100                           |
| 20            | 0.614                 | 100                           | 0.741                 | 100                           | 0.558                 | 100                           | 0.608                 | 100                           | 0.776                 | 100                           | 0.584                 | 100                           |
| 21            | 0.797                 | 100                           | 0.729                 | 100                           | 0.965                 | 100                           | 1.098                 | 100                           | 1.136                 | 100                           | 0.940                 | 100                           |
| 22            | 1.918                 | 100                           | 1.428                 | 100                           | 1.824                 | 100                           | 1.924                 | 100                           | 1.866                 | 100                           | 1.619                 | 100                           |
| 23            | 1.212                 | 100                           | 1.276                 | 100                           | 1.550                 | 100                           | 1.246                 | 100                           | 2.058                 | 100                           | 1.260                 | 100                           |
| 24            | 1.946                 | 100                           | 2.085                 | 100                           | 1.920                 | 100                           | 1.703                 | 100                           | 1.952                 | 100                           | 1.777                 | 100                           |
| 25            | 1.455                 | 100                           | 1.645                 | 100                           | 1.501                 | 100                           | 1.374                 | 100                           | 1.400                 | 100                           | 1.391                 | 100                           |
| 26            | 0.730                 | 100                           | 0.808                 | 100                           | 0.903                 | 100                           | 0.579                 | 100                           | 0.580                 | 100                           | 0.666                 | 100                           |
| 27            | 1.015                 | 100                           | 1.126                 | 100                           | 0.975                 | 100                           | 0.736                 | 100                           | 0.908                 | 100                           | 0.883                 | 100                           |
| 28            | 0.695                 | 100                           | 0.556                 | 100                           | 0.583                 | 100                           | 0.625                 | 100                           | 0.762                 | 100                           | 0.449                 | 100                           |
| 29            | 0.977                 | 100                           | 1.189                 | 100                           | 0.912                 | 100                           | 0.801                 | 100                           | 0.740                 | 100                           | 0.878                 | 100                           |
| 30            | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             |
| 31            | 0.621                 | 100                           | 0.767                 | 100                           | 0.477                 | 100                           | 0.413                 | 100                           | 0.748                 | 100                           | 1.230                 | 100                           |
| 32            | 0.513                 | 100                           | 0.614                 | 100                           | 0.541                 | 100                           | 0.429                 | 100                           | 0.455                 | 100                           | 0.497                 | 100                           |

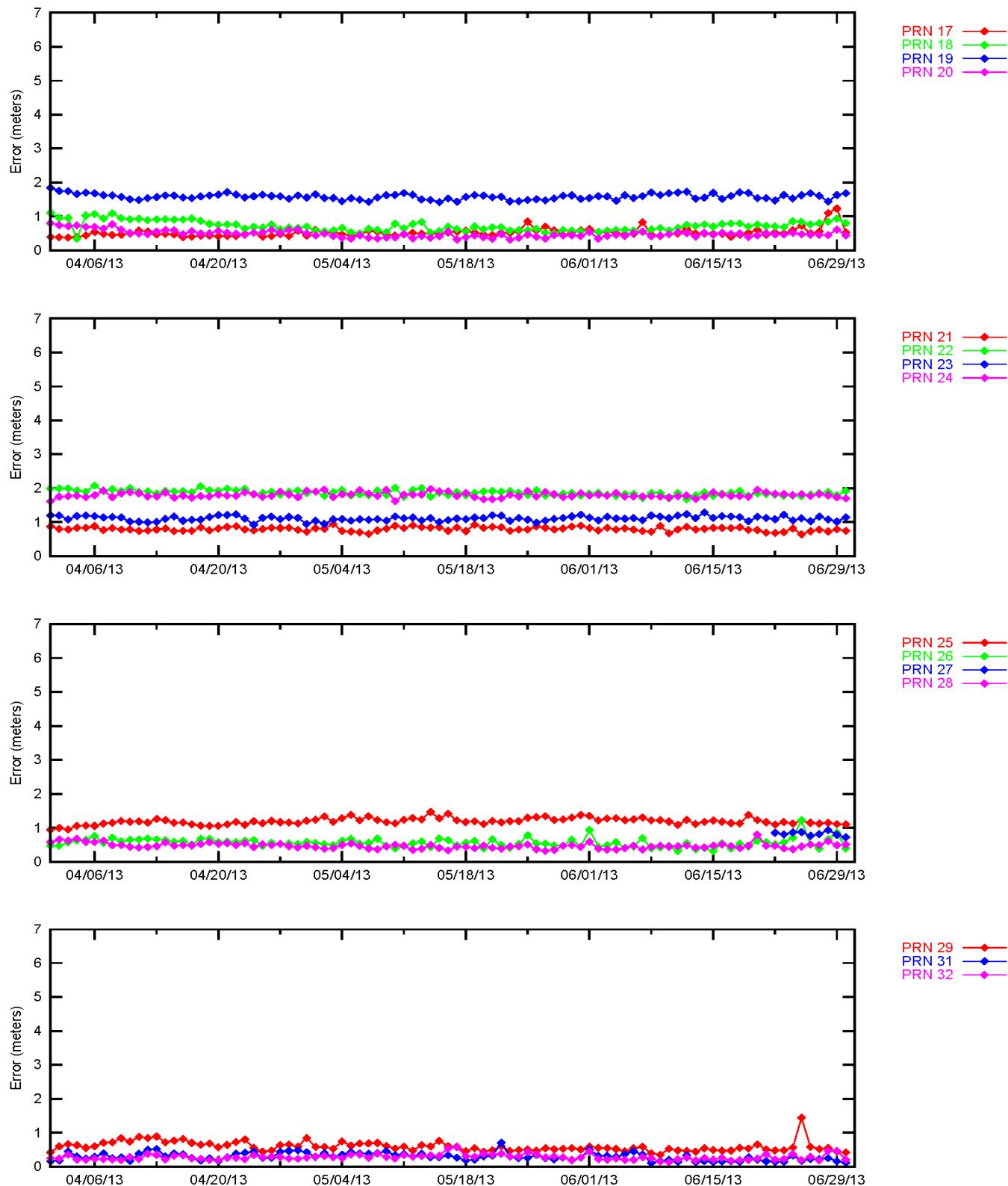
**Table 6-4 Ionospheric Error 95% index and 3.29 Sigma Bounding**

| <b>Site →</b> | <b>Los Angeles</b>    |                               | <b>Salt Lake City</b> |                               | <b>Miami</b>          |                               | <b>Minneapolis</b>    |                               | <b>Atlanta</b>        |                               | <b>Juneau</b>         |                               |
|---------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|
| <b>SV ↓</b>   | <b>95% Iono Error</b> | <b>3.29 Sigma Bounding(%)</b> |
| 1             | 1.418                 | 100                           | 1.709                 | 100                           | 1.471                 | 100                           | 1.924                 | 100                           | 1.404                 | 100                           | 1.692                 | 100                           |
| 2             | 0.957                 | 100                           | 0.822                 | 100                           | 1.156                 | 100                           | 0.857                 | 100                           | 0.992                 | 100                           | 1.683                 | 100                           |
| 3             | 0.693                 | 100                           | 0.540                 | 100                           | 0.662                 | 100                           | 0.694                 | 100                           | 0.419                 | 100                           | 0.886                 | 100                           |
| 4             | 1.159                 | 100                           | 1.275                 | 100                           | 0.948                 | 100                           | 0.982                 | 100                           | 0.848                 | 100                           | 1.193                 | 100                           |
| 5             | 0.849                 | 100                           | 1.050                 | 100                           | 0.996                 | 100                           | 1.019                 | 100                           | 0.730                 | 100                           | 1.134                 | 100                           |
| 6             | 0.542                 | 100                           | 0.820                 | 100                           | 0.595                 | 100                           | 0.716                 | 100                           | 0.590                 | 100                           | 0.946                 | 100                           |
| 7             | 0.761                 | 100                           | 0.680                 | 100                           | 1.049                 | 100                           | 0.665                 | 100                           | 0.458                 | 100                           | 1.002                 | 100                           |
| 8             | 0.510                 | 100                           | 0.598                 | 100                           | 0.683                 | 100                           | 0.577                 | 100                           | 0.383                 | 100                           | 1.035                 | 100                           |
| 9             | 0.582                 | 100                           | 0.721                 | 100                           | 0.652                 | 100                           | 0.607                 | 100                           | 0.464                 | 100                           | 0.856                 | 100                           |
| 10            | 0.454                 | 100                           | 0.432                 | 100                           | 0.418                 | 100                           | 0.401                 | 100                           | 0.617                 | 100                           | 1.078                 | 100                           |
| 11            | 0.586                 | 100                           | 0.383                 | 100                           | 0.740                 | 100                           | 0.460                 | 100                           | 0.617                 | 100                           | 1.031                 | 100                           |
| 12            | 0.609                 | 100                           | 0.726                 | 100                           | 0.764                 | 100                           | 0.854                 | 100                           | 0.551                 | 100                           | 0.937                 | 100                           |
| 13            | 0.488                 | 100                           | 0.909                 | 100                           | 0.751                 | 100                           | 0.667                 | 100                           | 0.412                 | 100                           | 0.993                 | 100                           |
| 14            | 0.491                 | 100                           | 0.513                 | 100                           | 0.663                 | 100                           | 0.390                 | 100                           | 0.528                 | 100                           | 1.099                 | 100                           |
| 15            | 0.734                 | 100                           | 0.795                 | 100                           | 0.772                 | 100                           | 0.973                 | 100                           | 0.645                 | 100                           | 1.053                 | 100                           |
| 16            | 0.574                 | 100                           | 0.458                 | 100                           | 0.642                 | 100                           | 0.481                 | 100                           | 0.738                 | 100                           | 1.153                 | 100                           |
| 17            | 0.899                 | 100                           | 0.926                 | 100                           | 0.726                 | 100                           | 0.714                 | 100                           | 0.477                 | 100                           | 1.072                 | 100                           |
| 18            | 0.607                 | 100                           | 0.833                 | 100                           | 0.654                 | 100                           | 0.772                 | 100                           | 0.983                 | 100                           | 1.526                 | 100                           |
| 19            | 1.275                 | 100                           | 1.386                 | 100                           | 1.355                 | 100                           | 1.255                 | 100                           | 1.663                 | 100                           | 1.801                 | 100                           |
| 20            | 0.483                 | 100                           | 0.532                 | 100                           | 0.842                 | 100                           | 0.683                 | 100                           | 0.750                 | 100                           | 1.273                 | 100                           |
| 21            | 0.708                 | 100                           | 0.624                 | 100                           | 1.386                 | 100                           | 0.813                 | 100                           | 0.947                 | 100                           | 1.555                 | 99.9880                       |
| 22            | 1.532                 | 100                           | 1.451                 | 100                           | 1.895                 | 100                           | 1.669                 | 100                           | 1.918                 | 100                           | 2.337                 | 99.6132                       |
| 23            | 1.410                 | 100                           | 1.256                 | 100                           | 1.592                 | 100                           | 1.135                 | 100                           | 1.494                 | 100                           | 1.836                 | 99.7704                       |
| 24            | 1.932                 | 100                           | 2.355                 | 100                           | 1.880                 | 100                           | 1.930                 | 100                           | 1.729                 | 100                           | 2.166                 | 100                           |
| 25            | 1.672                 | 100                           | 1.602                 | 100                           | 1.551                 | 100                           | 1.652                 | 100                           | 1.284                 | 100                           | 1.717                 | 100                           |
| 26            | 0.729                 | 100                           | 0.824                 | 100                           | 0.629                 | 100                           | 0.900                 | 100                           | 0.564                 | 100                           | 0.908                 | 100                           |
| 27            | 1.090                 | 100                           | 1.092                 | 100                           | 0.853                 | 100                           | 1.208                 | 100                           | 0.757                 | 100                           | 1.296                 | 100                           |
| 28            | 0.558                 | 100                           | 0.758                 | 100                           | 1.363                 | 100                           | 0.490                 | 100                           | 0.838                 | 100                           | 1.340                 | 100                           |
| 29            | 0.797                 | 100                           | 0.953                 | 100                           | 1.004                 | 100                           | 0.847                 | 100                           | 0.713                 | 100                           | 1.071                 | 100                           |
| 30            | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             | -                     | -                             |
| 31            | 0.542                 | 100                           | 0.629                 | 100                           | 0.696                 | 100                           | 0.456                 | 100                           | 0.352                 | 100                           | 0.932                 | 100                           |
| 32            | 0.491                 | 100                           | 0.730                 | 100                           | 0.602                 | 100                           | 0.447                 | 100                           | 0.408                 | 100                           | 0.898                 | 100                           |

**Figure 6-1 95% Range Error (PRN 1 – PRN 16) – Washington DC**

**Figure 6-2 95% Range Error (PRN 17 – PRN 32) – Washington DC**

**Figure 6-3 95% Ionospheric Error (PRN 1 – PRN 16) – Washington DC**

**Figure 6-4 95% Ionospheric Error (PRN 17 - PRN 32) – Washington DC**

## 7.0 GEO RANGING PERFORMANCE

The WAAS GEO navigation messages provide corrections and UDRE values for each satellite. The GEO ranging availability from each GEO navigation message source was evaluated separately to determine the quality of service provided.

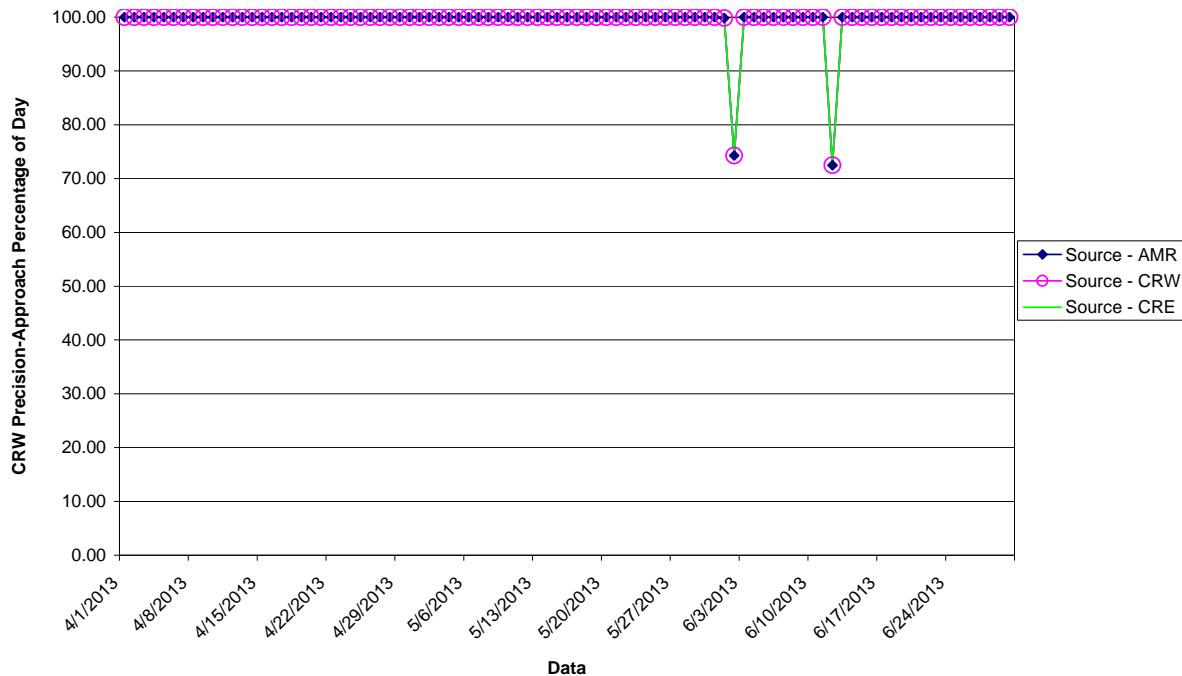
Table 7-1 shows the GEO-Ranging performance. Figure 7-1 shows the trend of CRW GEO PA Ranging Availability. Figure 7-2 shows the trend of CRE GEO PA Ranging Availability. Figure 7-3 shows the trend of AMR GEO NPA Ranging Availability.

**Table 7-1 GEO Ranging Availability**

| GEO Source | GEO | PA (%) | NPA (%) | Not Monitored (%) | Do Not Use (%) |
|------------|-----|--------|---------|-------------------|----------------|
| AMR 133    | CRW | 99.41  | 0.48    | 0.11              | 0.00           |
| AMR 133    | CRE | 98.58  | 1.16    | 0.25              | 0.00           |
| AMR 133    | AMR | 0.00   | 99.86   | 0.14              | 0.00           |
| CRW 135    | CRW | 99.41  | 0.48    | 0.11              | 0.00           |
| CRW 135    | CRE | 98.58  | 1.16    | 0.25              | 0.00           |
| CRW 135    | AMR | 0.00   | 99.86   | 0.14              | 0.00           |
| CRE 138    | CRW | 99.19  | 0.47    | 0.11              | 0.21           |
| CRE 138    | CRE | 98.82  | 0.90    | 0.16              | 0.11           |
| CRE 138    | AMR | 0.00   | 99.83   | 0.16              | 0.00           |

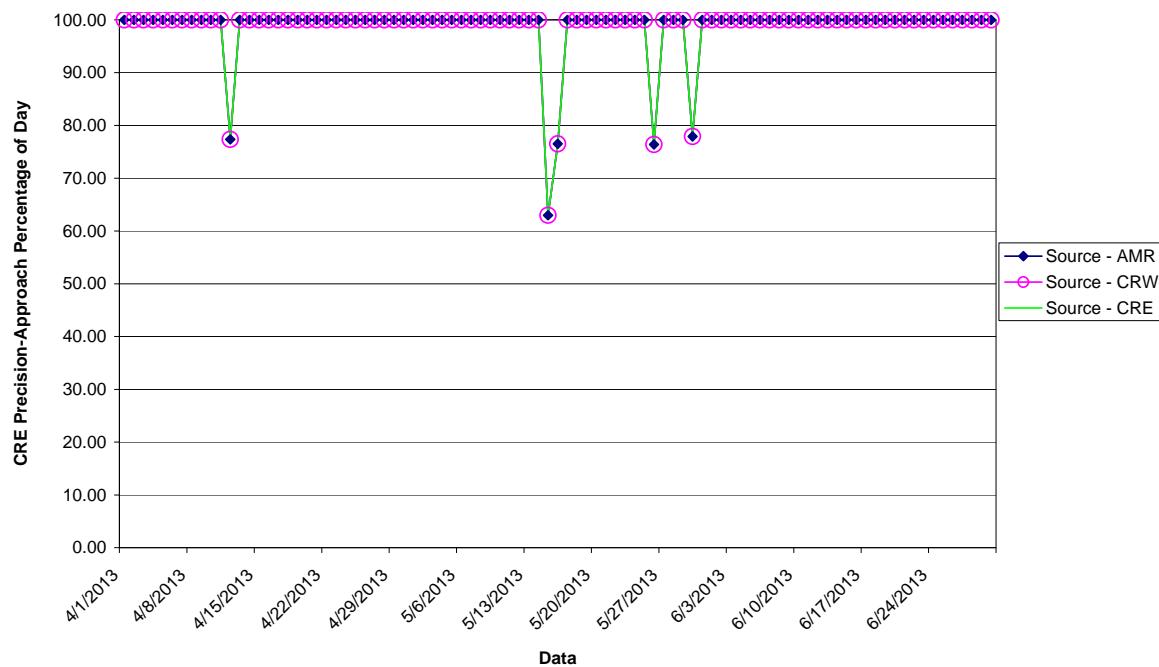
**Figure 7-1 Daily PA CRW GEO Ranging Availability Trend**

**CRW PA-Ranging Performance reported by AMR, CRW, and CRE**  
1 April - 30 June 2013

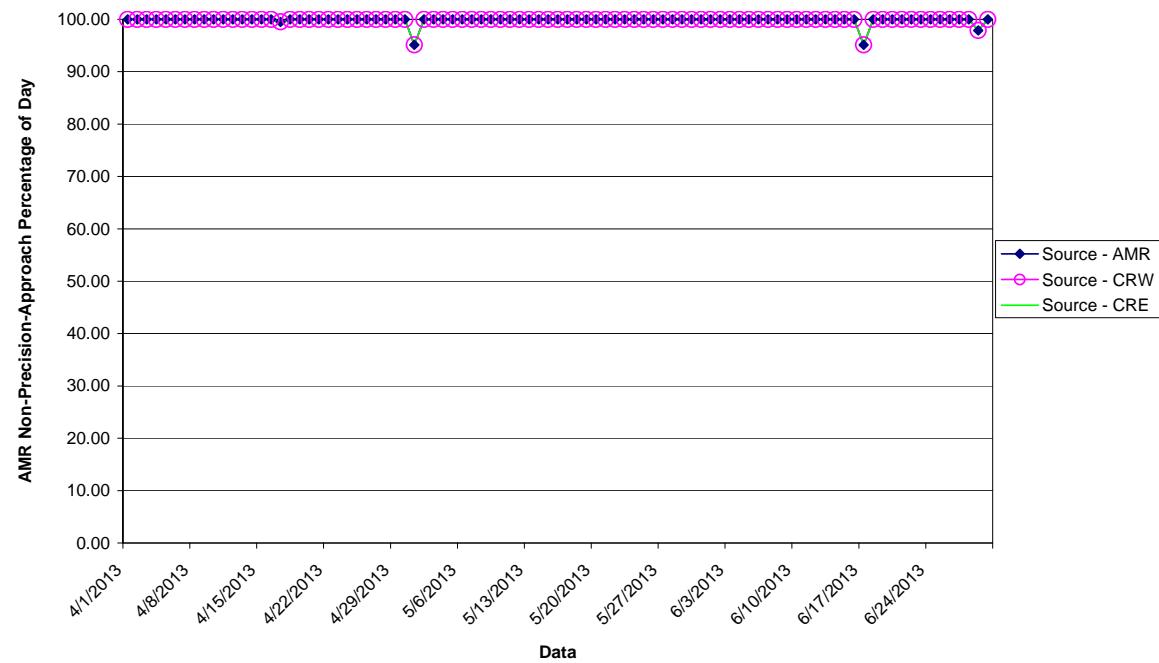


**Figure 7-2 Daily PA CRE GEO Ranging Availability Trend**

**CRE PA-Ranging Performance reported by AMR, CRW, and CRE**  
**1 April - 30 June 2013**

**Figure 7-3 Daily NPA AMR GEO Ranging Availability Trend**

**AMR NPA-Ranging Performance reported by AMR, CRW, and CRE**  
**1 April - 30 June 2013**



## 8.0 WAAS AIRPORT AVAILABILITY

The WAAS airport availability evaluation determines the number and length LPV service outages at selected airports from the transmitted WAAS navigation message. The navigation messages transmitted from all GEO satellites are processed simultaneously, and WAAS protection levels (VPL and HPL) are computed at each airport once every 30 second in accordance with the RTCA DO-229D. Once the protection levels have been produced at each airport an LPV service evaluation is conducted to identify outages in service (i.e. when protection levels exceed alert limits). WAAS LPV service is available for a user when the vertical protection level (VPL) is less than or equal to vertical alert limit (VAL) of 50 meters and the horizontal protection level (HPL) is less than or equal to horizontal alert limit (HAL) of 40 meters. If both conditions are met at a specified airport location then WAAS LPV service is available at that airport. If either one of the conditions are not met at a specified airport location then WAAS LPV service at that airport is unavailable and an outage in LPV service is recorded with its duration. When the LPV service becomes unavailable it is not considered available again until protection levels are below or equal to alert limits for at least 15 minutes. Although this will reduce LPV service availability minimally, it substantially reduces the number of service outages and prevents excessive switching in and out of service availability. Similar service analysis is completed for LP and LPV 200 services in accordance with HAL and VAL shown in Table 1-1. The number of WAAS LPV service outages and the availability at selected airports in the US and Canada for this evaluation period of WAAS operation is presented in Table 8-1. Figures 8-1 to 8-6 provide the graphical representation of the LP, LPV and LPV 200 availability and outage counts at all airports, including many that do not have published approaches. These results are depicted geographically on an interactive web page at <http://www.nstb.tc.faa.gov/AirportOutages/>.

The interactive web page can be accessed by entering the web address into an Internet browser and selecting the current quarter from the drop-down menu on the upper left corner and clicking "Submit Request". The WAAS LPV airport layer will appear providing color coded availability results as shown in Figures 8-1 to 8-2. Rolling over any airport with the cursor displays the LPV availability and number of LPV outages for the reporting period. The "WAAS Layer" menu in the upper right of the display allows the user to select WAAS LP or LPV 200 availability and the number of outage results as shown in Figures 8-3 to 8-6. The user can review WAAS availability performance for US airports with GPS RNAV instrument approach procedures by selecting "Show all Airports", or limit airports displayed to those with approved LPV approaches as provided in Table 8-1.

**Table 8-1 WAAS LP, LPV, and LPV200 Outages and Availability**

| Airport Id | Airport Name                   | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| CAL4       | Fort Mackay / Albian Aerodrome | AB             | LPV     | 3          | 0.9997   | 5           | 0.9993    | 5               | 0.9973        |
| CYXD       | Edmonton City Ctr              | AB             | LPV     | 3          | 0.9997   | 4           | 0.9995    | 6               | 0.9979        |
| CYEG       | Edmonton / Josephburg          | AB             | LPV     | 3          | 0.9997   | 4           | 0.9995    | 6               | 0.9979        |
| CEV3       | Vegreville                     | AB             | LPV     | 1          | 0.9997   | 5           | 0.9994    | 5               | 0.9977        |
| BET        | BETHEL                         | AK             | LPV200  | 1          | 0.9993   | 2           | 0.9989    | 14              | 0.9974        |
| KTN        | KETCHIKAN INTL                 | AK             | LPV     | 2          | 0.9995   | 2           | 0.9993    | 1               | 0.9982        |
| ELI        | ELIM                           | AK             | LPV     | 1          | 0.9994   | 3           | 0.9990    | 8               | 0.9981        |
| MDM        | MARSHALL DON HUNTER SR         | AK             | LP      | 1          | 0.9994   | 3           | 0.9990    | 9               | 0.9978        |
| SCC        | DEADHORSE                      | AK             | LPV     | 0          | 1        | 2           | 0.9997    | 20              | 0.9977        |
| SCM        | SCAMMON BAY                    | AK             | LP      | 2          | 0.9993   | 3           | 0.9988    | 42              | 0.9958        |
| AQH        | QUINHAGAK                      | AK             | LPV     | 1          | 0.9994   | 2           | 0.9988    | 38              | 0.9967        |
| CXF        | COLDFOOT                       | AK             | LP      | 0          | 1        | 4           | 0.9995    | 5               | 0.9985        |
| DLG        | DILLINGHAM                     | AK             | LPV     | 1          | 0.9994   | 2           | 0.9988    | 8               | 0.9979        |
| FAI        | FAIRBANKS INTL                 | AK             | LPV200  | 1          | 0.9999   | 3           | 0.9993    | 4               | 0.9988        |
| SMK        | ST MICHAEL                     | AK             | LPV     | 1          | 0.9994   | 4           | 0.9991    | 5               | 0.9981        |
| UNK        | UNALAKLEET                     | AK             | LP      | 1          | 0.9994   | 3           | 0.9991    | 5               | 0.9981        |
| WNA        | NAPAKIAK                       | AK             | LPV     | 1          | 0.9994   | 2           | 0.9989    | 15              | 0.9973        |
| 6A8        | ALLAKAKET                      | AK             | LP      | 0          | 1        | 2           | 0.9992    | 7               | 0.9987        |
| ENA        | KENAI MUNI                     | AK             | LPV200  | 1          | 0.9994   | 3           | 0.9991    | 2               | 0.9984        |

| Airport Id | Airport Name                         | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ENM        | EMMONAK                              | AK             | LPV     | 2          | 0.9994   | 3           | 0.9989    | 18              | 0.9974        |
| GKN        | GULKANA                              | AK             | LPV     | 1          | 0.9997   | 2           | 0.9992    | 3               | 0.9988        |
| MCG        | MCGRATH                              | AK             | LP      | 1          | 0.9994   | 3           | 0.9992    | 1               | 0.9984        |
| ORT        | NORTHWAY                             | AK             | LP      | 1          | 0.9998   | 2           | 0.9995    | 2               | 0.9987        |
| OTZ        | RALPH WIEN MEMORIAL                  | AK             | LPV200  | 3          | 0.9994   | 4           | 0.9989    | 134             | 0.9890        |
| PAQ        | PALMER MUNI                          | AK             | LP      | 2          | 0.9996   | 2           | 0.9992    | 1               | 0.9984        |
| SHX        | SHAGELUK                             | AK             | LPV     | 1          | 0.9994   | 3           | 0.9991    | 4               | 0.9982        |
| YAK        | YAKUTAT                              | AK             | LPV200  | 1          | 0.9995   | 3           | 0.9993    | 2               | 0.9983        |
| 2C7        | SHAKTOOLIK                           | AK             | LPV     | 1          | 0.9994   | 3           | 0.9990    | 5               | 0.9981        |
| 7KA        | TATITLEK                             | AK             | LP      | 1          | 0.9994   | 2           | 0.9992    | 2               | 0.9986        |
| AQT        | NUIQSUT                              | AK             | LPV     | 0          | 1.0000   | 3           | 0.9996    | 19              | 0.9977        |
| BRW        | WILEY POST-WILL ROGERS MEM           | AK             | LPV     | 3          | 0.9999   | 6           | 0.9996    | 221             | 0.9747        |
| KWT        | KWETHLUK                             | AK             | LPV     | 1          | 0.9994   | 2           | 0.9989    | 14              | 0.9975        |
| WLK        | SELAWIK                              | AK             | LPV     | 3          | 0.9997   | 2           | 0.9991    | 8               | 0.9980        |
| ANC        | TED STEVENS ANCHORAGE INTL           | AK             | LPV200  | 1          | 0.9994   | 2           | 0.9992    | 2               | 0.9984        |
| CLP        | CLARKS POINT                         | AK             | LPV     | 1          | 0.9994   | 2           | 0.9988    | 11              | 0.9978        |
| KYU        | KOYUKUK                              | AK             | LPV     | 1          | 0.9994   | 2           | 0.9991    | 4               | 0.9983        |
| SHG        | SHUNGNAK                             | AK             | LP      | 1          | 0.9997   | 2           | 0.9990    | 8               | 0.9983        |
| GAL        | EDWARD G. PITKA                      | AK             | LPV     | 1          | 0.9994   | 2           | 0.9991    | 5               | 0.9984        |
| HOM        | HOMER                                | AK             | LPV     | 1          | 0.9994   | 3           | 0.9991    | 2               | 0.9983        |
| HPB        | HOOPER BAY                           | AK             | LP      | 3          | 0.9993   | 2           | 0.9987    | 65              | 0.9938        |
| 9A3        | CHUATHBALUK                          | AK             | LPV     | 1          | 0.9994   | 3           | 0.9991    | 3               | 0.9982        |
| AKN        | KING SALMON                          | AK             | LPV     | 1          | 0.9994   | 2           | 0.9989    | 7               | 0.9981        |
| CDB        | COLD BAY                             | AK             | LPV200  | 1          | 0.9990   | 5           | 0.9984    | 463             | 0.9356        |
| CDV        | MERLE K (MUDHOLE) SMITH              | AK             | LPV     | 1          | 0.9995   | 2           | 0.9992    | 2               | 0.9986        |
| KAL        | KALTAG                               | AK             | LPV     | 1          | 0.9994   | 2           | 0.9991    | 5               | 0.9982        |
| KSM        | ST MARY'S                            | AK             | LPV200  | 1          | 0.9993   | 3           | 0.9990    | 14              | 0.9974        |
| MDO        | MIDDLETON ISLAND                     | AK             | LP      | 1          | 0.9994   | 1           | 0.9992    | 2               | 0.9984        |
| OOK        | TOKSOOK BAY                          | AK             | LP      | 2          | 0.9993   | 2           | 0.9988    | 84              | 0.9912        |
| RBY        | RUBY                                 | AK             | LPV     | 1          | 0.9994   | 2           | 0.9991    | 6               | 0.9985        |
| HLA        | HUSLIA                               | AK             | LPV     | 2          | 0.9996   | 2           | 0.9991    | 6               | 0.9984        |
| ILI        | ILIAMNA                              | AK             | LPV     | 1          | 0.9994   | 3           | 0.9991    | 2               | 0.9982        |
| D76        | ROBERT/BOB/CURTIS MEMORIAL           | AK             | LPV     | 4          | 0.9996   | 4           | 0.9989    | 92              | 0.9914        |
| ASN        | TALLADEGA MUNI                       | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DHN        | DOOTHAN RGNL                         | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HAB        | MARION COUNTY-RANKIN FITE            | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MSL        | NORTHWEST ALABAMA RGNL               | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TOI        | TROY MUNI                            | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 8A0        | ALBERTVILLE MUNI-T. J. BRUMLIK FIELD | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HSV        | HUNTSVILLE INTL-CARL T JONES FLD     | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TCL        | TUSCALOOSA RGNL                      | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AUO        | AUBURN UNIVERSITY RGNL               | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CQF        | H L SONNY CALLAHAN                   | AL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| JKA        | JACK EDWARDS                         | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SEM        | CRAIG FIELD                          | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BHM        | BIRMINGHAM INTL                      | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| EDN        | ENTERPRISE MUNI                           | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EET        | SHELBY COUNTY                             | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JFX        | WALKER COUNTY-BEVILL FIELD                | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PLR        | ST CLAIR COUNTY                           | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SCD        | MERKEL FIELD SYLACAUGA MUNI               | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 06A        | MOTON FIELD MUNI                          | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 0R1        | ATMORE MUNI                               | AL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 3A1        | FOLSOM FIELD                              | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 79J        | SOUTH ALABAMA RGNL AT BILL BENTON FIELD   | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 0J6        | HEADLAND MUNI                             | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 2R5        | ST ELMO                                   | AL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 9A4        | LAWRENCE COUNTY                           | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ANB        | ANNISTON METROPOLITAN                     | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DCU        | PRYOR FIELD RGNL                          | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MDQ        | MADISON COUNTY EXECUTIVE/TOM SHARP JR FLD | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 12J        | BREWTON MUNI                              | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 1R8        | BAY MINETTE MUNI                          | AL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BFM        | MOBILE DOWNTOWN                           | AL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| PYP        | CENTRE-PIEDMONT CHEROKEE COUNTY RGNL      | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 3M8        | NORTH PICKENS                             | AL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 4A9        | ISBELL FIELD                              | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EUF        | WEEDON FIELD                              | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GAD        | NORTHEAST ALABAMA RGNL                    | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| M95        | RICHARD ARTHUR FIELD                      | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MGM        | MONTGOMERY RGNL (DANNELLY FIELD)          | AL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MOB        | MOBILE RGNL                               | AL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| 1M4        | POSEY FIELD                               | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 5R4        | FOLEY MUNI                                | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EKY        | BESSEMER                                  | AL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ASG        | SPRINGDALE MUNI                           | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RUE        | RUSSELLVILLE RGNL                         | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 7M1        | MC GEHEE MUNI                             | AR             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| AWM        | WEST MEMPHIS MUNI                         | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FYV        | DRAKE FIELD                               | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M19        | NEWPORT MUNI                              | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SUZ        | SALINE COUNTY RGNL                        | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TXK        | TEXARKANA RGNL-WEBB FIELD                 | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FSM        | FORT SMITH RGNL                           | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HRO        | BOONE COUNTY                              | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PBF        | GRIDER FIELD                              | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4M3        | CARLISLE MUNI                             | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CDH        | HARRELL FIELD                             | AR             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| M77        | HOWARD COUNTY                             | AR             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ROG        | ROGERS MUNI-CARTER FIELD               | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SLG        | SMITH FIELD                            | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VBT        | BENTONVILLE MUNI/LOUISE M THADEN FIELD | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ARG        | WALNUT RIDGE RGNL                      | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ELD        | SOUTH ARKANSAS RGNL AT GOODWIN FIELD   | AR             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| SGT        | STUTTGART MUNI                         | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BVX        | BATESVILLE RGNL                        | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JBR        | JONESBORO MUNI                         | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LIT        | ADAMS FIELD                            | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BPK        | OZARK RGNL                             | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SRC        | SEARCY MUNI                            | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| XNA        | NORTHWEST ARKANSAS RGNL                | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BYH        | ARKANSAS INTERNATIONAL                 | AR             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ORK        | NORTH LITTLE ROCK MUNI                 | AR             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IWA        | PHOENIX-MESA GATEWAY                   | AZ             | LPV200  | 0          | 1        | 3           | 0.9999    | 3               | 0.9986        |
| PGA        | PAGE MUNI                              | AZ             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9999        |
| HII        | LAKE HAVASU CITY                       | AZ             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9995        |
| RQE        | WINDOW ROCK                            | AZ             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| FLG        | FLAGSTAFF PULLIAM                      | AZ             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| IFP        | LAUGHLIN/BULLHEAD INTL                 | AZ             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| FHU        | SIERRA VISTA MUNI-LIBBY AAF            | AZ             | LPV200  | 0          | 1        | 2           | 0.9989    | 7               | 0.9983        |
| P33        | COCHISE COUNTY                         | AZ             | LPV     | 0          | 1        | 3           | 0.9994    | 2               | 0.9983        |
| D68        | SPRINGERVILLE MUNI                     | AZ             | LP      | 0          | 1        | 2           | 1         | 2               | 0.9989        |
| DVT        | PHOENIX DEER VALLEY                    | AZ             | LPV     | 0          | 1        | 2           | 0.9999    | 3               | 0.9988        |
| SOW        | SHOW LOW RGNL                          | AZ             | LPV     | 0          | 1        | 2           | 1         | 2               | 0.9989        |
| FFZ        | FALCON FLD                             | AZ             | LP      | 0          | 1        | 2           | 0.9999    | 3               | 0.9987        |
| GEU        | GLENDALE MUNI                          | AZ             | LPV     | 0          | 1        | 2           | 0.9999    | 4               | 0.9986        |
| IGM        | KINGMAN                                | AZ             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| PHX        | PHOENIX SKY HARBOR INTL                | AZ             | LPV     | 0          | 1        | 2           | 0.9999    | 3               | 0.9985        |
| SAD        | SAFFORD RGNL                           | AZ             | LPV     | 0          | 1        | 3           | 0.9997    | 2               | 0.9986        |
| SJN        | ST JOHNS INDUSTRIAL AIR PARK           | AZ             | LP      | 0          | 1        | 0           | 1         | 5               | 0.9994        |
| PRC        | ERNEST A. LOVE FIELD                   | AZ             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9997        |
| AVQ        | MARANA RGNL                            | AZ             | LP      | 0          | 1        | 3           | 0.9996    | 8               | 0.9984        |
| TUS        | TUCSON INTL                            | AZ             | LPV     | 0          | 1        | 4           | 0.9993    | 7               | 0.9983        |
| CYYJ       | Victoria Intl                          | BC             | LPV     | 1          | 0.9999   | 2           | 0.9992    | 5               | 0.9983        |
| CYCD       | Nanaimo                                | BC             | LPV     | 2          | 0.9998   | 2           | 0.9991    | 5               | 0.9983        |
| CYBL       | Campbell River                         | BC             | LPV     | 1          | 0.9997   | 2           | 0.9990    | 3               | 0.9985        |
| CYXS       | Prince George                          | BC             | LPV     | 3          | 0.9995   | 3           | 0.9991    | 3               | 0.9985        |
| CYVR       | Vancouver Intl                         | BC             | LPV     | 1          | 0.9997   | 2           | 0.9991    | 5               | 0.9983        |
| CZBB       | Vancouver / Boundary Bay               | BC             | LPV     | 2          | 0.9999   | 2           | 0.9992    | 5               | 0.9983        |
| VCB        | NUT TREE                               | CA             | LPV     | 0          | 1        | 0           | 1         | 89              | 0.9955        |
| BLH        | BLYTHE                                 | CA             | LP      | 0          | 1        | 1           | 0.9999    | 6               | 0.9988        |
| DWA        | YOLO COUNTY-DAVIS/WOODLAND/WINTERS     | CA             | LPV     | 0          | 1        | 0           | 1         | 79              | 0.9966        |
| LHM        | LINCOLN RGNL/KARL HARDER FIELD         | CA             | LPV200  | 0          | 1        | 0           | 1         | 63              | 0.9988        |
| MOD        | MODESTO CITY-CO-HARRY SHAM FLD         | CA             | LPV     | 0          | 1        | 0           | 1         | 70              | 0.9985        |

| Airport Id | Airport Name                                  | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| SNA        | JOHN WAYNE-ORANGE COUNTY                      | CA             | LPV     | 0          | 1        | 2           | 0.9999    | 6               | 0.9983        |
| WLW        | WILLOWS-GLENN COUNTY                          | CA             | LPV     | 0          | 1        | 0           | 1         | 70              | 0.9972        |
| HHR        | HAWTHORNE JACK NORTHROP FIELD                 | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9984        |
| LSN        | LOS BANOS MUNI                                | CA             | LPV     | 0          | 1        | 1           | 1         | 77              | 0.9981        |
| LVK        | LIVERMORE MUNI                                | CA             | LPV     | 0          | 1        | 0           | 1         | 95              | 0.9938        |
| MYV        | YUBA COUNTY                                   | CA             | LPV200  | 0          | 1        | 0           | 1         | 67              | 0.9985        |
| SBP        | SAN LUIS COUNTY RGNL                          | CA             | LPV200  | 0          | 1        | 2           | 0.9999    | 89              | 0.9963        |
| TCY        | TRACY MUNI                                    | CA             | LPV     | 0          | 1        | 0           | 1         | 92              | 0.9965        |
| CIC        | CHICO MUNI                                    | CA             | LPV     | 0          | 1        | 0           | 1         | 53              | 0.9986        |
| CRQ        | MC CLELLAN-PALOMAR                            | CA             | LPV200  | 0          | 1        | 2           | 0.9998    | 6               | 0.9982        |
| DAG        | BARSTOW-DAGGETT                               | CA             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9994        |
| HWD        | HAYWARD EXECUTIVE                             | CA             | LPV     | 0          | 1        | 0           | 1         | 98              | 0.9914        |
| MAE        | MADERA MUNI                                   | CA             | LPV     | 0          | 1        | 1           | 1         | 8               | 0.9993        |
| ONT        | ONTARIO INTL                                  | CA             | LPV     | 0          | 1        | 1           | 1         | 7               | 0.9987        |
| POC        | BRACKETT FIELD                                | CA             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9987        |
| PRB        | PASO ROBLES MUNICIPAL                         | CA             | LPV200  | 0          | 1        | 2           | 0.9999    | 80              | 0.9972        |
| RHV        | REID-HILLVIEW OF SANTA CLARA                  | CA             | LPV     | 0          | 1        | 0           | 1         | 97              | 0.9926        |
| SMX        | SANTA MARIA PUBLIC/CAPT G ALLAN HANCOCK FIELD | CA             | LPV200  | 0          | 1        | 2           | 0.9999    | 87              | 0.9966        |
| APV        | APPLE VALLEY                                  | CA             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9991        |
| CVH        | HOLLISTER MUNI                                | CA             | LPV     | 0          | 1        | 1           | 1         | 97              | 0.9942        |
| LLR        | LITTLE RIVER                                  | CA             | LP      | 0          | 1        | 0           | 1         | 100             | 0.9891        |
| O27        | OAKDALE                                       | CA             | LPV     | 0          | 1        | 0           | 1         | 46              | 0.9989        |
| PVF        | PLACERVILLE                                   | CA             | LPV     | 0          | 1        | 0           | 1         | 17              | 0.9995        |
| RBL        | RED BLUFF MUNI                                | CA             | LPV     | 0          | 1        | 0           | 1         | 41              | 0.9984        |
| RDD        | REDDING MUNI                                  | CA             | LPV     | 0          | 1        | 0           | 1         | 32              | 0.9988        |
| SBA        | SANTA BARBARA MUNI                            | CA             | LPV     | 0          | 1        | 2           | 0.9999    | 26              | 0.9982        |
| SCK        | STOCKTON METROPOLITAN                         | CA             | LPV     | 0          | 1        | 0           | 1         | 84              | 0.9978        |
| SJC        | NORMAN Y. MINETA SAN JOSE INTERNATIONAL       | CA             | LPV     | 0          | 1        | 0           | 1         | 97              | 0.9920        |
| VIS        | VISALIA MUNI                                  | CA             | LPV200  | 0          | 1        | 1           | 1         | 6               | 0.9994        |
| WJF        | GENERAL WM J FOX AIRFIELD                     | CA             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9992        |
| CNO        | CHINO   | CA             | LPV     | 0          | 1        | 1           | 1         | 7               | 0.9987        |
| MHR        | SACRAMENTO MATHER                             | CA             | LPV200  | 0          | 1        | 0           | 1         | 68              | 0.9985        |
| MIT        | SHAFTER-MINTER FIELD                          | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9993        |
| O02        | NERVINO                                       | CA             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| O69        | PETALUMA MUNI                                 | CA             | LPV     | 0          | 1        | 0           | 1         | 100             | 0.9909        |
| OVE        | OROVILLE MUNI                                 | CA             | LPV     | 0          | 1        | 0           | 1         | 53              | 0.9987        |
| SAC        | SACRAMENTO EXECUTIVE                          | CA             | LPV200  | 0          | 1        | 0           | 1         | 74              | 0.9978        |
| VCV        | SOUTHERN CALIFORNIA LOGISTICS                 | CA             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9991        |
| ACV        | ARCATA  | CA             | LPV200  | 0          | 1        | 0           | 1         | 78              | 0.9938        |
| APC        | NAPA COUNTY                                   | CA             | LPV     | 0          | 1        | 0           | 1         | 95              | 0.9927        |
| CEC        | JACK MC NAMARA FIELD                          | CA             | LPV200  | 0          | 1        | 0           | 1         | 56              | 0.9969        |
| FAT        | FRESNO YOSEMITE INTL                          | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9994        |
| OXR        | OXNARD  | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9983        |
| RAL        | RIVERSIDE MUNI                                | CA             | LPV     | 0          | 1        | 1           | 1         | 7               | 0.9988        |
| SAN        | SAN DIEGO INTL                                | CA             | LP      | 1          | 1        | 3           | 0.9998    | 6               | 0.9981        |

| Airport Id | Airport Name                    | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| SMF        | SACRAMENTO INTL                 | CA             | LPV200  | 0          | 1        | 0           | 1         | 72              | 0.9978        |
| BFL        | MEADOWS FIELD                   | CA             | LPV200  | 0          | 1        | 1           | 1         | 6               | 0.9993        |
| C83        | BYRON                           | CA             | LPV     | 0          | 1        | 0           | 1         | 92              | 0.9959        |
| CCR        | BUCHANAN FIELD                  | CA             | LPV     | 0          | 1        | 0           | 1         | 93              | 0.9935        |
| CMA        | CAMARILLO                       | CA             | LPV     | 0          | 1        | 1           | 1         | 7               | 0.9985        |
| HAF        | HALF MOON BAY                   | CA             | LPV     | 0          | 1        | 0           | 1         | 100             | 0.9891        |
| LAX        | LOS ANGELES INTL                | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9983        |
|            | LONG BEACH/DAUGHERTY FIELD      | CA             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9984        |
| MCE        | MERCED RGNL/MACREADY FIELD      | CA             | LPV     | 0          | 1        | 0           | 1         | 34              | 0.9991        |
| MYF        | MONTGOMERY FIELD                | CA             | LPV200  | 0          | 1        | 2           | 0.9998    | 6               | 0.9981        |
| PMD        | PALMDALE USAF PLANT 42          | CA             | LPV200  | 0          | 1        | 0           | 1         | 7               | 0.9990        |
| TOA        | ZAMPERINI FIELD                 | CA             | LPV200  | 0          | 1        | 2           | 1         | 6               | 0.9983        |
| AAT        | ALTURAS MUNI                    | CA             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| AUN        | AUBURN MUNI                     | CA             | LPV     | 0          | 1        | 0           | 1         | 35              | 0.9993        |
| MER        | CASTLE                          | CA             | LPV200  | 0          | 1        | 0           | 1         | 37              | 0.9991        |
| MRY        | MONTEREY PENINSULA              | CA             | LPV     | 0          | 1        | 2           | 1         | 102             | 0.9913        |
| O88        | RIO VISTA MUNI                  | CA             | LP      | 0          | 1        | 0           | 1         | 88              | 0.9965        |
|            | METROPOLITAN OAKLAND INTL       | CA             | LPV     | 0          | 1        | 0           | 1         | 98              | 0.9909        |
| SEE        | GILLESPIE FIELD                 | CA             | LP      | 0          | 1        | 2           | 0.9998    | 6               | 0.9982        |
|            | SAN FRANCISCO INTERNATIONAL     | CA             | LPV     | 0          | 1        | 0           | 1         | 100             | 0.9900        |
| SNS        | SALINAS MUNI                    | CA             | LPV200  | 0          | 1        | 2           | 1         | 100             | 0.9928        |
| STS        | CHARLES M. SCHULZ-SONOMA COUNTY | CA             | LPV     | 0          | 1        | 0           | 1         | 99              | 0.9908        |
| ITR        | KIT CARSON COUNTY               | CO             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| LAA        | LAMAR MUNI                      | CO             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9999        |
|            | CITY OF COLORADO SPRINGS MUNI   | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| COS        | DENVER INTL                     | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| DRO        | DURANGO-LA PLATA COUNTY         | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| FTG        | FRONT RANGE                     | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| GJT        | GRAND JUNCTION RGNL             | CO             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| LHX        | LA JUNTA MUNI                   | CO             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| CEZ        | CORTEZ MUNI                     | CO             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9999        |
|            | FORT COLLINS-LOVELAND MUNI      | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| FNL        | YAMPA VALLEY                    | CO             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| MTJ        | MONTROSE RGNL                   | CO             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| RIL        | GARFIELD COUNTY RGNL            | CO             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| FMM        | FORT MORGAN MUNI                | CO             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| TEX        | TELLURIDE RGNL                  | CO             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9999        |
|            | SAN LUIS VALLEY                 |                |         |            |          |             |           |                 |               |
| ALS        | RGNL/BERGMAN FIELD              | CO             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
|            | ROCKY MOUNTAIN METROPOLITAN     | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| GXY        | GREELEY-WELD COUNTY             | CO             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| PUB        | PUEBLO MEMORIAL                 | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| STK        | STERLING MUNI                   | CO             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |

| Airport Id | Airport Name                                | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| APA        | CENTENNIAL                                  | CO             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| BDL        | BRADLEY INTL                                | CT             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HVN        | TWEED-NEW HAVEN                             | CT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OXC        | WATERBURY-OXFORD                            | CT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GON        | GROTON-NEW LONDON                           | CT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IJD        | WINDHAM                                     | CT             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| DCA        | RONALD REAGAN<br>WASHINGTON NATL            | DC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HEF        | MANASSAS RGNL/HARRY P.<br>DAVIS FIELD       | DC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IAD        | WASHINGTON DULLES INTL                      | DC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ILG        | NEW CASTLE                                  | DE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EVY        | SUMMIT                                      | DE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GED        | SUSSEX COUNTY                               | DE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 33N        | DELAWARE AIRPARK                            | DE             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| XFL        | FLAGLER COUNTY                              | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| CEW        | BOB SIKES                                   | FL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CTY        | CROSS CITY                                  | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| F45        | NORTH PALM BEACH COUNTY<br>GENERAL AVIATION | FL             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9999        |
| FHB        | FERNANDINA BEACH MUNI                       | FL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FPR        | ST LUCIE COUNTY INTL                        | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| LEE        | LEESBURG INTL                               | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1.0000        |
| ORL        | EXECUTIVE                                   | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| PBI        | PALM BEACH INTL                             | FL             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| TIX        | SPACE COAST RGNL                            | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| APF        | NAPLES MUNI                                 | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| BKV        | HERNANDO COUNTY                             | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BOW        | BARTOW MUNI                                 | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| COI        | MERRITT ISLAND                              | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| ECP        | NORTHWEST FLORIDA<br>BEACHES INTL           | FL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EYW        | KEY WEST INTL                               | FL             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| FMY        | PAGE FIELD                                  | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| IMM        | IMMOKALEE RGNL                              | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| MKY        | MARCO ISLAND                                | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| PHK        | PALM BEACH COUNTY GLADES                    | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| SEF        | SEBRING RGNL                                | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 1             |
| TMB        | KENDALL-TAMIA MI EXECUTIVE                  | FL             | LPV200  | 0          | 1        | 0           | 1         | 8               | 0.9997        |
| 54J        | DEFUNIAK SPRINGS                            | FL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| EVB        | NEW SMYRNA BEACH MUNI                       | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| FXE        | FT LAUDERDALE EXECUTIVE                     | FL             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| HEG        | HERLONG RECREATIONAL                        | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| LCQ        | LAKE CITY MUNI                              | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| PMP        | POMPANO BEACH AIRPARK                       | FL             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| TLH        | TALLAHASSEE RGNL                            | FL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CRG        | CRAIG MUNI                                  | FL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DTS        | DESTIN-FORT WALTON BEACH                    | FL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| JAX        | JACKSONVILLE INTL                           | FL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MLB        | MELBOURNE INTL                              | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| OBE        | OKEECHOBEE COUNTY                           | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |

| Airport Id | Airport Name                    | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| RSW        | SOUTHWEST FLORIDA INTL          | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| SGJ        | ST AUGUSTINE                    | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| CHN        | WAUCHULA MUNI                   | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| DAB        | DAYTONA BEACH INTL              | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MCO        | ORLANDO INTL                    | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| PIE        | ST PETERSBURG-CLEARWATER INTL   | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| SFB        | ORLANDO SANFORD INTL            | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| SRQ        | SARASOTA/BRADENTON INTL         | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| TPA        | TAMPA INTL                      | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| VQQ        | CECIL FIELD                     | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 28J        | PALATKA MUNICIPAL ARPT          | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| FLL        | FORT LAUDERDALE/HOLLYWOOD INTL  | FL             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| LAL        | LAKELAND LINDER RGNL            | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MIA        | MIAMI INTL                      | FL             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9997        |
| OPF        | OPA LOCKA EXECUTIVE             | FL             | LPV200  | 0          | 1        | 0           | 1         | 6               | 0.9998        |
| VDF        | TAMPA EXECUTIVE                 | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| VRB        | VERO BEACH MUNI                 | FL             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| X51        | HOMESTEAD GENERAL AVIATION      | FL             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9997        |
| 40J        | PERRY-FOLEY                     | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AAF        | APALACHICOLA MUNI               | FL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AVO        | AVON PARK EXECUTIVE             | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| GNV        | GAINESVILLE RGNL                | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| ISM        | KISSIMMEE GATEWAY               | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| OCF        | OCALA INTL-JIM TAYLOR FLD       | FL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| PGD        | PUNTA GORDA                     | FL             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| PNS        | PENSACOLA RGNL                  | FL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TPF        | PETER O KNIGHT                  | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| X07        | LAKE WALES MUNI                 | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| X14        | LA BELLE MUNI                   | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| X35        | MARION CO & PARK OF COMMERCE    | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| ZPH        | ZEPHYRHILLS MUNI                | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 1J0        | TRI-COUNTY                      | FL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| BCT        | BOCA RATON                      | FL             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| DED        | DELAND MUNI-SIDNEY H TAYLOR FLD | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| GIF        | WINTER HAVEN'S GILBERT          | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| MTH        | THE FLORIDA KEYS MARATHON       | FL             | LPV     | 0          | 1        | 0           | 1         | 8               | 0.9997        |
| PCM        | PLANT CITY MUNI                 | FL             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| SUA        | WITHAM FIELD                    | FL             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| VNC        | VENICE MUNI                     | FL             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| X26        | SEBASTIAN MUNI                  | FL             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| ABY        | SOUTHWEST GEORGIA RGNL          | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DNN        | DALTON MUNI                     | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FFC        | ATLANTA RGNL FALCON FIELD       | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HOE        | HOMERVILLE                      | GA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| MAC        | MACON DOWNTOWN                            | GA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| SBO        | EAST GEORGIA REGIONAL                     | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WDR        | WINDER-BARROW                             | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 6A2        | GRIFFIN-SPALDING COUNTY                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BHC        | BAXLEY MUNI                               | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GVL        | LEE GILMER MEMORIAL                       | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HQU        | THOMSON-MCDUFFIE COUNTY                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OPN        | THOMASTON-UPSON COUNTY                    | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RYY        | COBB COUNTY-MC COLLUM FIELD               | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 48A        | COCHRAN                                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4J6        | ST MARYS                                  | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 52A        | MADISON MUNI                              | GA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 70J        | CAIRO-GRADY COUNTY                        | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ATL        | HARTSFIELD - JACKSON ATLANTA INTL         | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BGE        | DECATUR COUNTY INDUSTRIAL AIR PARK        | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BIJ        | EARLY COUNTY                              | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CNI        | CHEROKEE COUNTY                           | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FTY        | FULTON COUNTY AIRPORT-BROWN FIELD         | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TMA        | HENRY TIFTON MYERS                        | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VLD        | VALDOSTA RGNL                             | GA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 09J        | JEKYLL ISLAND                             | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 2J5        | MILLENNIUM FIELD                          | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4A4        | POLK COUNTY AIRPORT-CORNELIUS MOORE FIELD | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ACJ        | JIMMY CARTER RGNL                         | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CTJ        | WEST GEORGIA RGNL-O V GRAY FIELD          | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| D73        | MONROE-WALTON COUNTY                      | GA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| EZM        | HEART OF GEORGIA RGNL                     | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FZG        | FITZGERALD MUNI                           | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MCN        | MIDDLE GEORGIA RGNL                       | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MLJ        | BALDWIN COUNTY                            | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PIM        | HARRIS COUNTY                             | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PUJ        | PAULDING NORTHWEST ATLANTA                | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RMG        | RICHARD B RUSSELL                         | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TOC        | TOCCOA RG LETOURNEAU FIELD                | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VPC        | CARTERSVILLE                              | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 19A        | JACKSON COUNTY                            | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BQK        | BRUNSWICK GOLDEN ISLES                    | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DQH        | DOUGLAS MUNI                              | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| IY         | WASHINGTON-WILKES COUNTY                  | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LGC        | LAGRANGE-CALLAWAY                         | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MQW        | TELFAIR-WHEELER                           | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PXE        | PERRY-HOUSTON COUNTY                      | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                         | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| 3J7        | GREENE COUNTY RGNL                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AGS        | AUGUSTA RGNL AT BUSH FIELD           | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AJR        | HABERSHAM COUNTY                     | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CSG        | COLUMBUS METROPOLITAN                | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SAV        | SAVANNAH/HILTON HEAD INTL            | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 18A        | FRANKLIN COUNTY                      | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CKF        | CRISP COUNTY-CORDELE                 | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CWV        | CLAXTON-EVANS COUNTY                 | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JZP        | PICKENS COUNTY                       | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TVI        | THOMASVILLE RGNL                     | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VDI        | VIDALIA RGNL                         | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 17J        | DONALSONVILLE MUNI                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4J1        | BRANTLEY COUNTY                      | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AHN        | ATHENS/BEN EPPS                      | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AYS        | WAYCROSS-WARE COUNTY                 | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CCO        | NEWNAN COWETA COUNTY                 | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CVC        | COVINGTON MUNI                       | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JES        | JESUP-WAYNE COUNTY                   | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JYL        | PLANTATION ARPK                      | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LZU        | GWINNETT COUNTY-BRISCOE FIELD        | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MGR        | MOULTRIE MUNI                        | GA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OKZ        | KAOLIN FIELD                         | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RVJ        | SWINTON SMITH FLD AT REIDSVILLE MUNI | GA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| TBR        | STATESBORO-BULLOCH COUNTY            | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 15J        | COOK COUNTY                          | GA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CIN        | ARTHUR N NEU                         | IA             | LPV     | 0          | 1        | 1           | 1         | 2               | 0.9998        |
| LRJ        | LE MARS MUNI                         | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9995        |
| POH        | POCAHONTAS MUNI                      | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9995        |
| PEA        | PELLA MUNI                           | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ALO        | WATERLOO RGNL                        | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9995        |
| SDA        | SHENANDOAH MUNI                      | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BRL        | SOUTHEAST IOWA RGNL                  | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SHL        | SHELDON MUNI                         | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| RDK        | RED OAK MUNI                         | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| OOA        | OSKALOOSA MUNI                       | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| OXV        | KNOXVILLE MUNI                       | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| FOD        | FORT DODGE RGNL                      | IA             | LPV200  | 0          | 1        | 1           | 0.9999    | 2               | 0.9995        |
| CWI        | CLINTON MUNI                         | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| DSM        | DES MOINES INTL                      | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| IIB        | INDEPENDENCE MUNI                    | IA             | LP      | 0          | 1        | 1           | 1         | 2               | 0.9997        |
| IKV        | ANKENY RGNL                          | IA             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| IOW        | IOWA CITY MUNI                       | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| MPZ        | MOUNT PLEASANT MUNICIPAL             | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| MXO        | MONTICELLO RGNL                      | IA             | LP      | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| AMW        | AMES MUNI                            | IA             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| SKI        | SAC CITY MUNI                        | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9996        |

| Airport Id | Airport Name                    | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| VTI        | VINTON VETERANS MEML ARPK       | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| AIO        | ATLANTIC MUNI                   | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| CID        | THE EASTERN IOWA                | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| CKP        | CHEROKEE COUNTY RGNL            | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9995        |
| CSQ        | CRESTON MUNI                    | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| DEH        | DECORAH MUNI                    | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9994        |
| MCW        | MASON CITY MUNI                 | IA             | LPV200  | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| FFL        | FAIRFIELD MUNI                  | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| TZT        | BELLE PLAINE MUNI               | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| SPW        | SPENCER MUNI                    | IA             | LPV200  | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| MUT        | MUSCATINE MUNI                  | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| EFW        | JEFFERSON MUNI                  | IA             | LPV     | 0          | 1        | 1           | 1         | 2               | 0.9998        |
| OTM        | OTTUMWA RGNL                    | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| PRO        | PERRY MUNI                      | IA             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| TNU        | NEWTON MUNI                     | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| CBF        | COUNCIL BLUFFS MUNI             | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| EBS        | WEBSTER CITY MUNI               | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9996        |
| DVN        | DAVENPORT MUNI                  | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| I75        | OSCEOLA MUNI                    | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ICL        | SCHENCK FIELD                   | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SLB        | STORM LAKE MUNI                 | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9996        |
| TVK        | CENTERVILLE MUNI                | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| AWG        | WASHINGTON MUNI                 | IA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| EST        | ESTHERVILLE MUNI                | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9992        |
| DBQ        | DUBUQUE RGNL                    | IA             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| DNS        | DENISON MUNI                    | IA             | LPV     | 0          | 1        | 1           | 1         | 2               | 0.9998        |
| EOK        | KEOKUK MUNI                     | IA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FXY        | FOREST CITY MUNI                | IA             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| GGI        | GRINNELL RGNL                   | IA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SUX        | SIOUX GATEWAY/COL BUD DAY FIELD | IA             | LPV200  | 0          | 1        | 1           | 1         | 2               | 0.9996        |
| TWF        | JOSLIN FIELD-MAGIC VALLEY RGNL  | ID             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| LWS        | LEWISTON-NEZ PERCE COUNTY       | ID             | LPV200  | 0          | 1        | 0           | 1         | 7               | 0.9989        |
| GNG        | GOODING MUNI                    | ID             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| MYL        | MC CALL MUNICIPAL               | ID             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9993        |
| MAN        | NAMPA MUNI                      | ID             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| BOI        | BOISE AIR TERMINAL/GOWEN FLD    | ID             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| DIJ        | DRIGGS-REED MEMORIAL            | ID             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9996        |
| JER        | JEROME COUNTY                   | ID             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| IDA        | IDAHO FALLS RGNL                | ID             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| EUL        | CALDWELL INDUSTRIAL             | ID             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| PIH        | POCATELLO RGNL                  | ID             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| U76        | MOUNTAIN HOME MUNI              | ID             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| COE        | PAPPY BOYINGTON FIELD           | ID             | LPV200  | 0          | 1        | 2           | 1         | 7               | 0.9986        |
| RPJ        | ROCHELLE MUNI-KORITZ FIELD      | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| UGN        | WAUKEGAN RGNL                   | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| 3LF        | LITCHFIELD MUNI                 | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                                | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| DNV        | VERMILION COUNTY                            | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ENL        | CENTRALIA MUNI                              | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FOA        | FLORA MUNI                                  | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MTO        | COLES COUNTY MEMORIAL                       | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PWK        | CHICAGO EXECUTIVE                           | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| RFD        | CHICAGO/ROCKFORD INTL                       | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| SQI        | WHITESIDE COUNTY-JOS J BITTORF FLD          | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| BLV        | SCOTT AFB/MIDAMERICA                        | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BMI        | CENTRAL IL REG'L ARPT AT BLOOMINGTON-NORMAL | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| C15        | PEKIN MUNI                                  | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IGQ        | LANSING MUNI                                | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SAR        | SPARTA COMMUNITY-HUNTER FIELD               | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UIN        | QUINCY RGNL-BALDWIN FIELD                   | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DPA        | DUPAGE                                      | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| RSV        | ROBINSON MUNI                               | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| C73        | DIXON MUNI-CHARLES R. WALGREEN FLD          | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| CMI        | UNIVERSITY OF ILLINOIS-WILLARD              | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CPS        | ST LOUIS DOWNTOWN                           | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DEC        | DECATUR                                     | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DKB        | DE KALB TAYLOR MUNI                         | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| LWV        | LAWRENCEVILLE-VINCENNES INTL                | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MWA        | WILLIAMSON COUNTY RGNL                      | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ORD        | CHICAGO-O'HARE INTL                         | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ALN        | ST LOUIS RGNL                               | IL             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FEP        | ALBERTUS                                    | IL             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| HSB        | HARRISBURG-RALEIGH                          | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LOT        | LEWIS UNIVERSITY                            | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MDW        | CHICAGO MIDWAY INTL                         | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SFY        | TRI-TOWNSHIP                                | IL             | LP      | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| SPI        | ABRAHAM LINCOLN CAPITAL                     | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 3MY        | MOUNT HAWLEY AUXILIARY                      | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I63        | MOUNT STERLING MUNI                         | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IKK        | GREATER KANKAKEE                            | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MLI        | QUAD CITY INTL                              | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| ARR        | AURORA MUNI                                 | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| CUL        | CARMI MUNI                                  | IL             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| GBG        | GALESBURG MUNI                              | IL             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| PNT        | PONTIAC MUNI                                | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AJG        | MOUNT CARMEL MUNI                           | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MVN        | MOUNT VERNON                                | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PIA        | GREATER PEORIA RGNL                         | IL             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AID        | ANDERSON MUNI-DARLINGTON FIELD              | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BFR        | VIRGIL I GRISSOM MUNI                       | IN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| GSH        | GOSHEN MUNI                                 | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| LAF        | PURDUE UNIVERSITY                      | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OXI        | STARKE COUNTY                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RCR        | FULTON COUNTY                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RZL        | JASPER COUNTY                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GWB        | DE KALB COUNTY                         | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GYY        | GARY/CHICAGO INTERNATIONAL             | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HFY        | GREENWOOD MUNI                         | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HNB        | HUNTINGBURG                            | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I22        | RANDOLPH COUNTY                        | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IND        | INDIANAPOLIS INTL                      | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MIE        | DELAWARE COUNTY-JOHNSON FIELD          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SBN        | SOUTH BEND RGNL                        | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TEL        | PERRY COUNTY MUNI                      | IN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| TYQ        | INDIANAPOLIS EXECUTIVE                 | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VPZ        | PORTER COUNTY MUNI                     | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BAK        | COLUMBUS MUNI                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GGP        | LOGANSPORT/CASS COUNTY                 | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| IMS        | MADISON MUNI                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OVO        | NORTH VERNON                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SMD        | SMITH FIELD                            | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4I7        | PUTNAM COUNTY                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BMG        | MONROE COUNTY                          | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EYE        | EAGLE CREEK AIRPARK                    | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FRH        | FRENCH LICK MUNI                       | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MZZ        | MARION MUNI                            | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ASW        | WARSAW MUNICIPAL                       | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JVY        | CLARK RGNL                             | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PLD        | PORLAND MUNI                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GEZ        | SHELBYVILLE MUNI                       | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SER        | FREEMAN MUNI                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EKM        | ELKHART MUNI                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OKK        | KOKOMO MUNI                            | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RID        | RICHMOND MUNI                          | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EVV        | EVANSVILLE RGNL                        | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FWA        | FORT WAYNE INTERNATIONAL               | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HUF        | TERRE HAUTE INTERNATIONAL-HULMAN FIELD | IN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MCX        | WHITE COUNTY                           | IN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| MQJ        | MOUNT COMFORT                          | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CEV        | METTEL FIELD                           | IN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ANY        | ANTHONY MUNI                           | KS             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| LWC        | LAWRENCE MUNI                          | KS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OEL        | OAKLEY MUNI                            | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| ADT        | ATWOOD-RAWLINS COUNTY CITY-COUNTY      | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| CBK        | SHALZ FIELD                            | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| EMP        | EMPORIA MUNI                           | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FOE        | FORBES FIELD                           | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                       | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| GCK        | GARDEN CITY RGNL                   | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 1             |
| HUT        | HUTCHINSON MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MHK        | MANHATTAN RGNL                     | KS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MPR        | MCPHERSON                          | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UKL        | COFFEY COUNTY                      | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LBL        | LIBERAL MID-AMERICA RGNL           | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LQR        | LARNED PAWNEE CO                   | KS             | LPV     | 0          | 1        | 0           | 1         | 2               | 1             |
| PTT        | PRATT INDUSTRIAL                   | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RPB        | BELLEVILLE MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FSK        | FORT SCOTT MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HYS        | HAYS RGNL                          | KS             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| IDP        | INDEPENDENCE MUNI                  | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IXD        | NEW CENTURY AIRCENTER              | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| K88        | ALLEN COUNTY                       | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TOP        | PHILIP BILLARD MUNI                | KS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DDC        | DODGE CITY RGNL                    | KS             | LPV     | 0          | 1        | 0           | 1         | 2               | 1             |
| HQG        | HUGOTON MUNI                       | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ICT        | WICHITA MID-CONTINENT              | KS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RSL        | RUSSELL MUNI                       | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 3AU        | AUGUSTA MUNI                       | KS             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| AAO        | COLONEL JAMES JABARA               | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EHA        | ELKHART-MORTON COUNTY              | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| NRN        | NORTON MUNI                        | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OJC        | JOHNSON COUNTY EXECUTIVE           | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OWI        | OTTAWA MUNI                        | KS             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| TQK        | SCOTT CITY MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| ULS        | ULYSSES                            | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 1             |
| 3K3        | SYRACUSE-HAMILTON COUNTY MUNICIPAL | KS             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| CNK        | BLOSSER MUNI                       | KS             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| GLD        | RENNER FLD/GOODLAND MUNI/          | KS             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| SLN        | SALINA MUNI                        | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EGT        | WELLINGTON MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EWK        | NEWTON-CITY-COUNTY                 | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GBD        | GREAT BEND MUNI                    | KS             | LPV200  | 0          | 1        | 0           | 1         | 2               | 1             |
| MYZ        | MARYSVILLE MUNI                    | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PPF        | TRI-CITY                           | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PTS        | ATKINSON MUNI                      | KS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BWG        | BOWLING GREEN-WARREN CTY RGNL      | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TZV        | TOMPKINSVILLE-MONROE COUNTY        | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LOU        | BOWMAN FIELD                       | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M21        | MUHLENBERG COUNTY                  | KY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| TWT        | STURGIS MUNI                       | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BYL        | WILLIAMSBURG-WHITLEY COUNTY        | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LEX        | BLUE GRASS                         | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LOZ        | LONDON-CORBIN ARPT-MAGEE FLD       | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| CEY        | KYLE-OAKLEY FIELD                         | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CPF        | WENDELL H FORD                            | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DVK        | STUART POWELL FIELD                       | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| K22        | BIG SANDY RGNL                            | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SME        | LAKE CUMBERLAND RGNL                      | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BRY        | SAMUELS FIELD                             | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EHR        | HENDERSON CITY-COUNTY                     | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GLW        | GLASGOW MUNI                              | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AAS        | TAYLOR COUNTY                             | KY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| SDF        | LOUISVILLE INTL-STANDIFORD FLD            | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 6I2        | LEBANON-SPRINGFIELD                       | KY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 7K4        | OHIO COUNTY                               | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FGX        | FLEMING-MASON                             | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I39        | MADISON                                   | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| KY8        | HANCOCK CO-RON LEWIS FIELD                | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 2I0        | MADISONVILLE MUNI                         | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EKX        | ADDINGTON FIELD                           | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 27K        | GEORGETOWN SCOTT CO-MARSHALL FLD          | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CVG        | CINCINNATI/NORTHERN KENTUCKY INTL         | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DWU        | ASHLAND RGNL                              | KY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| M97        | MOREHEAD-ROWAN COUNTY CLYDE A THOMAS RGNL | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OWB        | OWENSBORO-DAVIESS COUNTY                  | KY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PAH        | BARKLEY RGNL                              | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HVC        | HOPKINSVILLE-CHRISTIAN COUNTY             | KY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BQP        | MOREHOUSE MEMORIAL                        | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| M79        | JOHN H HOOKS JR MEMORIAL                  | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AEX        | ALEXANDRIA INTL                           | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ESF        | ESLER RGNL                                | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| HUM        | HOUMA-TERREBONNE                          | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| IYA        | ABBEVILLE CHRIS CRUSTA MEML               | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| MLU        | MONROE RGNL                               | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MSY        | LOUIS ARMSTRONG NEW ORLEANS INTL          | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| TVR        | VICKSBURG TALLULAH RGNL                   | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 3R4        | HART                                      | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| CWF        | CHENNAULT INTL                            | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| F88        | JONESBORO                                 | LA             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| IER        | NATCHITOCHES RGNL                         | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| LFT        | LAFAYETTE RGNL                            | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| GAO        | SOUTH LAFOURCHE LEONARD MILLER JR         | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| PTN        | HARRY P WILLIAMS MEMORIAL                 | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ACP        | ALLEN PARISH                              | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |

| Airport Id | Airport Name                                | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| HZR        | FALSE RIVER RGNL                            | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SHV        | SHREVEPORT RGNL                             | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| ARA        | ACADIANA RGNL                               | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| BXA        | GEORGE R CARR MEMORIAL AIR FIELD            | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| BTR        | BATON ROUGE METRO                           | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| L39        | LEESVILLE                                   | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| LCH        | LAKE CHARLES RGNL                           | LA             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| NEW        | LAKEFRONT                                   | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| OPL        | ST LANDRY PARISH-AHART FIELD                | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| RSN        | RUSTON RGNL AIRPORT                         | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| UXL        | SOUTHLAND FIELD                             | LA             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| 1L0        | ST JOHN THE BAPTIST PARISH                  | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| DTN        | SHREVEPORT DOWNTOWN                         | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| HDC        | HAMMOND NORTHSORE RGNL                      | LA             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| L38        | LOUISIANA RGNL                              | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SPH        | SPRINGHILL                                  | LA             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| OWD        | NORWOOD MEMORIAL                            | MA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ORE        | ORANGE MUNI                                 | MA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EWB        | NEW BEDFORD RGNL                            | MA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 3B0        | SOUTHBRIDGE MUNI                            | MA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LWM        | LAWRENCE MUNI                               | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ACK        | NANTUCKET MEMORIAL                          | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HYA        | BARNSTABLE MUNI-BOARDMAN/POLANDO FIELD      | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MVY        | MARTHAS VINEYARD                            | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ORH        | WORCESTER RGNL                              | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BVY        | BEVERLY MUNI                                | MA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PYM        | PLYMOUTH MUNI                               | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BED        | LAURENCE G HANSCOM FLD                      | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BAF        | BARNES MUNI                                 | MA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GBR        | WALTER J KOLADZA                            | MA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| BOS        | GEN EDWARD LAWRENCE LOGAN INTL              | MA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CBE        | GREATER CUMBERLAND RGNL                     | MD             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| ESN        | EASTON/NEWNAM FIELD                         | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MTN        | MARTIN STATE                                | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OXB        | OCEAN CITY MUNI                             | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DMW        | CARROLL COUNTY REGNL/JACK B POAGE FIELD     | MD             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 2G4        | GARRETT COUNTY                              | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GAI        | MONTGOMERY COUNTY AIRPARK                   | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SBY        | SALISBURY-OCEAN CITY WICOMICO RGNL          | MD             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BWI        | BALTIMORE/WASHINGTON INTL THURGOOD MARSHALL | MD             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 2W6        | ST. MARY'S COUNTY RGNL                      | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| HGR        | HAGERSTOWN RGNL-RICHARD A HENSON FIELD | MD             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FDK        | FREDERICK MUNI                         | MD             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BGR        | BANGOR INTL                            | ME             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BXM        | BRUNSWICK EXECUTIVE                    | ME             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WVL        | WATERVILLE ROBERT LAFLEUR              | ME             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| LEW        | AUBURN/LEWISTON MUNI                   | ME             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BHB        | HANCOCK COUNTY-BAR HARBOR              | ME             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| FVE        | NORTHERN AROOSTOOK RGNL                | ME             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| HUL        | HOULTON INTL                           | ME             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| SFM        | SANFORD RGNL                           | ME             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 81B        | OXFORD COUNTY RGNL                     | ME             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| AUG        | AUGUSTA STATE                          | ME             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MLT        | MILLINOCKET MUNI                       | ME             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| PWM        | PORTLAND INTL JETPORT                  | ME             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RKD        | KNOX COUNTY RGNL                       | ME             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 1B0        | DEXTER RGNL                            | ME             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| PQI        | NORTHERN MAINE RGNL ARPT AT PRESQUE IS | ME             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MNM        | MENOMINEE-MARINETTE TWIN COUNTY        | MI             | LPV200  | 0          | 1        | 2           | 0.9998    | 1               | 0.9994        |
| PLN        | PELLSTON RGNL AIRPORT OF EMMET COUNTY  | MI             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| GDW        | GLADWIN ZETTEL MEMORIAL                | MI             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| MBS        | MBS INTL                               | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MCD        | MACKINAC ISLAND                        | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| MKG        | MUSKEGON COUNTY                        | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| YIP        | WILLOW RUN                             | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AMN        | GRATIOT COMMUNITY                      | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FFX        | FREMONT MUNI                           | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FNT        | BISHOP INTL                            | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LWA        | SOUTH HAVEN AREA RGNL                  | MI             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| N98        | BOYNE CITY MUNI                        | MI             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| OSC        | OSCODA-WURTSMITH                       | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PHN        | SAINT CLAIR COUNTY INTL                | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 77G        | MARLETTE                               | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BAX        | HURON COUNTY MEMORIAL                  | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BIV        | TULIP CITY                             | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CVX        | CHARLEVOIX MUNI                        | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| IRS        | KIRSCH MUNI                            | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ISQ        | SCHOOLCRAFT COUNTY                     | MI             | LP      | 1          | 1        | 1           | 1         | 3               | 0.9998        |
| LAN        | CAPITAL REGION INTL                    | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LDM        | MASON COUNTY                           | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| SLH        | CHEBOYGAN COUNTY                       | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| TTF        | CUSTER                                 | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AZO        | KALAMAZOO/BATTLE CREEK INTERNATIONAL   | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| DTW        | DETROIT METROPOLITAN WAYNE COUNTY         | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ESC        | DELTA COUNTY                              | MI             | LPV200  | 2          | 1        | 3           | 0.9999    | 1               | 0.9993        |
| HYX        | SAGINAW COUNTY H.W. BROWNE                | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MOP        | MOUNT PLEASANT MUNI                       | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OZW        | LIVINGSTON COUNTY SPENCER J. HARDY        | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PTK        | OAKLAND COUNTY INTL                       | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SAW        | SAWYER INTL                               | MI             | LPV200  | 1          | 0.9996   | 2           | 0.9996    | 1               | 0.9993        |
| TVC        | CHERRY CAPITAL                            | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 9D9        | HASTINGS                                  | MI             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| APN        | ALPENA COUNTY RGNL                        | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BTL        | W K KELLOGG                               | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ERY        | LUCE COUNTY                               | MI             | LPV     | 1          | 1        | 1           | 1         | 2               | 0.9999        |
| ADG        | LENAWEET COUNTY                           | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ANJ        | SAULT STE MARIE MUNI - SANDERSON FIELD    | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BEH        | SOUTHWEST MICHIGAN RGNL                   | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CAD        | WEXFORD COUNTY                            | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CIU        | CHIPPEWA COUNTY INTL                      | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| DET        | COLEMAN A YOUNG MUNI                      | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IMT        | FORD                                      | MI             | LPV     | 2          | 0.9996   | 2           | 0.9995    | 1               | 0.9993        |
| IWD        | GOGEBIC-IRON COUNTY                       | MI             | LPV200  | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| JXN        | JACKSON COUNTY-REYNOLDS FIELD             | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ACB        | ANTRIM COUNTY                             | MI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.999981      |
| ARB        | ANN ARBOR MUNI                            | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CMX        | HOUGHTON COUNTY MEMORIAL                  | MI             | LPV     | 1          | 0.9993   | 1           | 0.9993    | 3               | 0.9993        |
| GLR        | GAYLORD RGNL                              | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GRR        | GERALD R. FORD INTL                       | MI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| IKW        | JACK BARSTOW                              | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OEB        | BRANCH COUNTY MEMORIAL                    | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RNP        | OWOSO COMMUNITY                           | MI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MGG        | MAPLE LAKE MUNI                           | MN             | LP      | 1          | 0.9995   | 1           | 0.9992    | 2               | 0.9992        |
| MSP        | MINNEAPOLIS-ST PAUL INTL/WOLD-CHAMBERLAIN | MN             | LPV200  | 1          | 0.9995   | 1           | 0.9994    | 2               | 0.9992        |
| RGK        | RED WING RGNL                             | MN             | LPV200  | 2          | 0.9997   | 1           | 0.9994    | 1               | 0.9992        |
| RST        | ROCHESTER INTL                            | MN             | LPV200  | 1          | 1        | 2           | 0.9995    | 1               | 0.9992        |
| ORB        | ORR RGNL                                  | MN             | LP      | 1          | 0.9994   | 1           | 0.9992    | 5               | 0.9990        |
| STP        | ST PAUL DOWNTOWN HOLMAN FLD               | MN             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 2               | 0.9992        |
| TVF        | THIEF RIVER FALLS                         | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9988        |
| VVV        | ORTONVILLE MUNI-MARTINSON FIELD           | MN             | LP      | 1          | 0.9995   | 1           | 0.9993    | 4               | 0.9990        |
| CBG        | CAMBRIDGE MUNI                            | MN             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9992        |
| CKN        | CROOKSTON MUNI/KIRKWOOD FLD               | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9987        |
| CNB        | MYERS FIELD                               | MN             | LPV     | 1          | 0.9996   | 1           | 0.9993    | 3               | 0.9991        |

| Airport Id | Airport Name                                 | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| DTL        | DETROIT LAKES-WETHING FIELD                  | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| FSE        | FOSSTON MUNI                                 | MN             | LP      | 1          | 0.9994   | 1           | 0.9992    | 5               | 0.9990        |
| BDE        | BAUDETTE INTL                                | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9989        |
| BRD        | BRAINERD LAKES RGNL                          | MN             | LPV200  | 1          | 0.9995   | 1           | 0.9992    | 3               | 0.9991        |
| LJF        | LITCHFIELD MUNI                              | MN             | LPV     | 1          | 0.9996   | 1           | 0.9993    | 2               | 0.9992        |
| LVN        | AIRLAKE                                      | MN             | LPV200  | 1          | 0.9996   | 1           | 0.9994    | 2               | 0.9992        |
| OTG        | WORTHINGTON MUNI                             | MN             | LPV200  | 1          | 1        | 2           | 0.9997    | 1               | 0.9992        |
| AXN        | CHANDLER FIELD                               | MN             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 4               | 0.9991        |
| BDH        | WILLMAR MUNI-JOHN L RICE FIELD               | MN             | LPV     | 1          | 0.9996   | 1           | 0.9993    | 3               | 0.9991        |
| CKC        | GRAND MARAIS/COOK COUNTY                     | MN             | LPV     | 1          | 0.9993   | 1           | 0.9993    | 3               | 0.9992        |
| FCM        | FLYING CLOUD                                 | MN             | LPV200  | 1          | 0.9995   | 1           | 0.9994    | 2               | 0.9992        |
| FRM        | FAIRMONT MUNI                                | MN             | LPV     | 0          | 1        | 2           | 0.9996    | 1               | 0.9992        |
| GPZ        | GRAND RAPIDS/ITASCA CO-GORDON NEWSTROM       | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| ONA        | WINONA MUNI-MAX CONRAD FLD                   | MN             | LPV     | 2          | 0.9999   | 1           | 0.9995    | 1               | 0.9993        |
| OWA        | OWATONNA DEGNER RNGL                         | MN             | LPV200  | 2          | 0.9997   | 1           | 0.9994    | 1               | 0.9992        |
| ROX        | ROSEAU MUNI/RUDY BILLBERG FIELD              | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 3               | 0.9988        |
| RRT        | WARROAD INTL MEMORIAL                        | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 3               | 0.9988        |
| STC        | ST CLOUD RGNL                                | MN             | LPV200  | 1          | 0.9995   | 1           | 0.9992    | 3               | 0.9991        |
| BBB        | BENSON MUNI                                  | MN             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 4               | 0.9990        |
| D39        | SAUK CENTRE MUNI                             | MN             | LP      | 1          | 0.9995   | 1           | 0.9992    | 3               | 0.9991        |
| ELO        | ELY MUNI                                     | MN             | LPV200  | 1          | 0.9993   | 1           | 0.9993    | 4               | 0.9991        |
| BJI        | BEMIDJI RGNL                                 | MN             | LPV200  | 1          | 0.9994   | 1           | 0.9992    | 6               | 0.9990        |
| FFM        | FERGUS FALLS MUNI-EINAR MICKELSON FLD        | MN             | LPV200  | 1          | 0.9995   | 1           | 0.9992    | 4               | 0.9990        |
| MKT        | MANKATO RGNL                                 | MN             | LPV200  | 1          | 0.9996   | 1           | 0.9994    | 1               | 0.9992        |
| RWF        | REDWOOD FALLS MUNI                           | MN             | LPV     | 1          | 0.9996   | 1           | 0.9993    | 2               | 0.9992        |
| AUM        | AUSTIN MUNI                                  | MN             | LPV200  | 0          | 1        | 2           | 0.9996    | 1               | 0.9992        |
| COQ        | CLOQUET CARLTON COUNTY                       | MN             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 3               | 0.9991        |
| HCD        | HUTCHINSON MUNI-BUTLER FIELD                 | MN             | LPV     | 1          | 0.9996   | 1           | 0.9993    | 2               | 0.9992        |
| INL        | FALLS INTL                                   | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| JKJ        | MOORHEAD MUNI                                | MN             | LPV     | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| AEL        | ALBERT LEA MUNI                              | MN             | LPV     | 0          | 1        | 2           | 0.9996    | 1               | 0.9992        |
| DXX        | LAC QUI PARLE COUNTY                         | MN             | LPV200  | 1          | 0.9996   | 1           | 0.9993    | 4               | 0.9991        |
| FOZ        | BIGFORK MUNICIPAL                            | MN             | LP      | 1          | 0.9994   | 1           | 0.9992    | 5               | 0.9990        |
| HIB        | RANGE RGNL                                   | MN             | LPV200  | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| LYV        | QUENTIN AANENSON FIELD                       | MN             | LPV200  | 0          | 1        | 2           | 0.9997    | 2               | 0.9992        |
| MML        | SOUTHWEST MINNESOTA RGNL MARSHALL/RYAN FIELD | MN             | LPV200  | 1          | 0.9997   | 1           | 0.9993    | 3               | 0.9991        |
| PKD        | PARK RAPIDS MUNI-KONSHOK FIELD               | MN             | LPV200  | 1          | 0.9994   | 1           | 0.9992    | 5               | 0.9990        |
| ROS        | RUSH CITY RGNL                               | MN             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9992        |
| SAZ        | STAPLES MUNI                                 | MN             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 4               | 0.9991        |
| TWM        | RICHARD B HELGESON                           | MN             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 3               | 0.9992        |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ANE        | ANOKA COUNTY-BLAINE ARPT (JANES FIELD) | MN             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 2               | 0.9992        |
| CQM        | COOK MUNI                              | MN             | LP      | 1          | 0.9994   | 1           | 0.9992    | 5               | 0.9990        |
| DLH        | DULUTH INTL                            | MN             | LPV200  | 1          | 0.9994   | 1           | 0.9993    | 4               | 0.9991        |
| ETH        | WHEATON MUNI                           | MN             | LP      | 1          | 0.9995   | 1           | 0.9993    | 4               | 0.9990        |
| FKA        | FILLMORE COUNTY                        | MN             | LPV     | 0          | 1        | 3           | 0.9997    | 1               | 0.9992        |
| LXL        | LITTLE FALLS/MORRISON CO-LINDBERGH FLD | MN             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 3               | 0.9991        |
| MZH        | MOOSE LAKE CARLTON COUNTY              | MN             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 3               | 0.9991        |
| STL        | LAMBERT-ST LOUIS INTL                  | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| M05        | CARUTHERSVILLE MEM                     | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PLK        | M. GRAHAM CLARK DOWNTOWN               | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RCM        | SKYHAVEN                               | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SGF        | SPRINGFIELD-BRANSON NATIONAL           | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UBX        | CUBA MUNI                              | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BUM        | BUTLER MEMORIAL                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DMO        | SEDALIA MEMORIAL                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EVU        | NORTHWEST MISSOURI RGNL                | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| K02        | PERRYVILLE MUNI                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| K57        | GOULD PETERSON MUNI                    | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LXT        | LEE'S SUMMIT MUNI                      | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MHL        | MARSHALL MEML MUNI                     | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VER        | JESSE VIERTEL MEMORIAL                 | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 6M6        | LEWIS COUNTY RGNL                      | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GPH        | MIDWEST NATIONAL AIR CENTER            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HIG        | HIGGINSVILLE INDUSTRIAL MUNI           | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LRY        | LAWRENCE SMITH MEMORIAL                | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MCI        | KANSAS CITY INTL                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MO8        | NORTH CENTRAL MISSOURI RGNL            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UNO        | WEST PLAINS MUNI                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 8WC        | WASHINGTON COUNTY AIRPORT              | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AIZ        | LEE C FINE MEMORIAL                    | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CGI        | CAPE GIRARDEAU RGNL                    | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EIW        | COUNTY MEMORIAL                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FTT        | ELTON HENSLEY MEMORIAL                 | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| POF        | POPLAR BLUFF MUNI                      | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SIK        | SIKESTON MEML MUNI                     | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| STJ        | ROSECRANS MEMORIAL                     | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SUS        | SPIRIT OF ST LOUIS                     | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TRX        | TRENTON MUNI                           | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 1H0        | CREVE COEUR                            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| H79        | ELDON MODEL AIRPARK                    | MO             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| M17        | BOLIVAR MUNI                           | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MYJ        | MEXICO MEMORIAL                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| TBN        | WAYNESVILLE-ST ROBERT RGNL/FORNEY AAF  | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UVU        | SULLIVAN RGNL                          | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 2H2        | JERRY SUMNERS SR AURORA MUNICIPAL      | MO             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| CHT        | CHILLICOTHE MUNI                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| COU        | COLUMBIA RGNL                          | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DXE        | DEXTER MUNI                            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HAE        | HANNIBAL RGNL                          | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IRK        | KIRKSVILLE RGNL                        | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| JEF        | JEFFERSON CITY MEMORIAL                | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BBG        | BRANSON                                | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FWB        | BRANSON WEST MUNI-EMERSON FIELD        | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HJF        | MONETT MUNI                            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MAW        | MALDEN MUNI                            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| NVD        | NEVADA MUNI                            | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| VIH        | ROLLA NATIONAL                         | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EOS        | NEOSHO HUGH ROBINSON                   | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EZZ        | CAMERON MEMORIAL                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FAM        | FARMINGTON RGNL                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FYG        | WASHINGTON RGNL                        | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| H21        | CAMDENTON MEMORIAL                     | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JLN        | JOPLIN RGNL                            | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M48        | HOUSTON MEMORIAL                       | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MBY        | OMAR N BRADLEY                         | MO             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MKC        | CHARLES B. WHEELER DOWNTOWN            | MO             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MJD        | PICAYUNE MUNI                          | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| IDL        | INDIANOLA MUNI                         | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| HSA        | STENNIS INTL                           | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| GWO        | GREENWOOD-LEFLORE                      | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GTR        | GOLDEN TRIANGLE RGNL                   | MS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GNF        | GRENADA MUNI                           | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CRX        | ROSCOE TURNER                          | MS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| M40        | MONROE COUNTY                          | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GPT        | GULFPORT-BILOXI INTL                   | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| 87I        | YAZOO COUNTY                           | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| JVW        | JOHN BELL WILLIAMS                     | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| HKS        | HAWKINS FIELD                          | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| TUP        | TUPELO RGNL                            | MS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OLV        | OLIVE BRANCH                           | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MCB        | MC COMB-PIKE COUNTY-JOHN E LEWIS FIELD | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| M43        | PRENTISS-JEFFERSON DAVIS COUNTY        | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| JAN        | JACKSON-EVERS INTL                     | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| CKM        | FLETCHER FIELD                         | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RNV        | CLEVELAND MUNI                         | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| PQL        | TRENT LOTT INTL                        | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MPE        | PHILADELPHIA MUNI                      | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |

| Airport Id | Airport Name                          | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| HBG        | HATTIESBURG BOBBY L. CHAIN MUNI       | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| GLH        | MID DELTA RGNL                        | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| MEI        | KEY FIELD                             | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| UTA        | TUNICA MUNI                           | MS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| UOX        | UNIVERSITY-OXFORD                     | MS             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HEZ        | HARDY-ANDERS FLD NATCHEZ-ADAMS COUNTY | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| PIB        | HATTIESBURG-LAUREL RGNL               | MS             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| STF        | GEORGE M BRYAN                        | MS             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LUL        | HESLER-NOBLE FIELD                    | MS             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| MSO        | MISSOULA INTERNATIONAL                | MT             | LPV     | 0          | 1        | 2           | 1         | 6               | 0.9984        |
| M75        | MALTA                                 | MT             | LP      | 1          | 0.9997   | 2           | 0.9991    | 5               | 0.9983        |
| 7S0        | RONAN                                 | MT             | LPV     | 0          | 1        | 0           | 1         | 6               | 0.9982        |
| WYS        | YELLOWSTONE                           | MT             | LPV200  | 0          | 1        | 2           | 0.9999    | 6               | 0.9993        |
| MLS        | FRANK WILEY FIELD                     | MT             | LPV     | 2          | 0.9999   | 2           | 0.9992    | 3               | 0.9985        |
| HVR        | HAVRE CITY-COUNTY                     | MT             | LPV     | 1          | 0.9999   | 4           | 0.9996    | 5               | 0.9983        |
| LWT        | LEWISTOWN MUNI                        | MT             | LPV200  | 0          | 1        | 2           | 0.9995    | 4               | 0.9986        |
| GPI        | GLACIER PARK INTL                     | MT             | LPV     | 0          | 1        | 2           | 1.0000    | 5               | 0.9980        |
| GTF        | GREAT FALLS INTL                      | MT             | LPV200  | 0          | 1        | 2           | 0.9997    | 7               | 0.9984        |
| SBX        | SHELBY                                | MT             | LP      | 0          | 1        | 4           | 0.9998    | 6               | 0.9983        |
| 6S8        | LAUREL MUNICIPAL                      | MT             | LPV     | 0          | 1        | 2           | 0.9995    | 5               | 0.9986        |
| GDV        | DAWSON COMMUNITY                      | MT             | LPV     | 1          | 0.9997   | 1           | 0.9991    | 3               | 0.9985        |
| GGW        | WOKAL FIELD/GLASGOW INTL              | MT             | LPV200  | 1          | 0.9996   | 1           | 0.9990    | 4               | 0.9984        |
| BTM        | BERT MOONEY                           | MT             | LPV     | 0          | 1        | 2           | 0.9999    | 7               | 0.9987        |
| 4U6        | CIRCLE TOWN COUNTY                    | MT             | LPV     | 1          | 0.9997   | 1           | 0.9991    | 3               | 0.9985        |
| 1S3        | TILLITT FIELD                         | MT             | LPV     | 1          | 1.0000   | 1           | 0.9992    | 3               | 0.9985        |
| PWD        | SHER-WOOD                             | MT             | LPV200  | 1          | 0.9995   | 1           | 0.9990    | 3               | 0.9982        |
| SDY        | SIDNEY-RICHLAND MUNI                  | MT             | LPV     | 1          | 0.9996   | 1           | 0.9990    | 4               | 0.9986        |
| OLF        | L M CLAYTON                           | MT             | LPV200  | 1          | 0.9996   | 1           | 0.9990    | 5               | 0.9985        |
| HLN        | HELENA RGNL                           | MT             | LPV     | 0          | 1        | 1           | 0.9999    | 6               | 0.9984        |
| BZN        | GALLATIN FIELD                        | MT             | LPV     | 0          | 1        | 2           | 0.9999    | 7               | 0.9985        |
| RPX        | ROUNDUP                               | MT             | LPV     | 0          | 1        | 1           | 0.9993    | 4               | 0.9986        |
| LVM        | MISSION FIELD                         | MT             | LP      | 0          | 1        | 1           | 0.9998    | 6               | 0.9985        |
| BIL        | BILLINGS LOGAN INTL                   | MT             | LPV200  | 0          | 1        | 1           | 0.9993    | 4               | 0.9986        |
| CYQM       | Moncton Intl                          | NB             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| CYCL       | Charlo                                | NB             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AKH        | GASTONIA MUNI                         | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RWI        | ROCKY MOUNT-WILSON RGNL               | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| INT        | SMITH REYNOLDS                        | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ONX        | CURRITUCK COUNTY RGNL                 | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SOP        | MOORE COUNTY                          | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TDF        | PERSON COUNTY                         | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RDU        | RALEIGH-DURHAM INTL                   | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AFP        | ANSON COUNTY-JEFF CLOUD FLD           | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EWN        | COASTAL CAROLINA RGNL                 | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EXX        | DAVIDSON COUNTY                       | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MWK        | MOUNT AIRY/SURRY COUNTY               | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SVH        | STATESVILLE RGNL                      | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| TTA        | RALEIGH EXEC AT SANFORD-LEE COUNTY        | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BUY        | BURLINGTON-ALAMANCE RGNL                  | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CTZ        | CLINTON-SAMPSON COUNTY                    | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EYF        | CURTIS L BROWN JR FIELD                   | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| JQF        | CONCORD RGNL                              | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MEB        | LAURINBURG-MAXTON                         | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PGV        | PITT-GREENVILLE                           | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AVL        | ASHEVILLE RGNL                            | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ECG        | ELIZABETH CITY CG AIR STATION/RGNL        | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HKY        | HICKORY RGNL                              | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ILM        | WILMINGTON INTL                           | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OAJ        | ALBERT J ELLIS                            | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OCW        | WARREN FIELD                              | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RUQ        | ROWAN COUNTY                              | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HNZ        | HENDERSON-OXFORD                          | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IPJ        | LINCOLNTON-LINCOLN COUNTY RGNL            | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EHO        | SHELBY-CLEVELAND COUNTY RGNL              | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EQY        | MONROE RGNL                               | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FAY        | FAYETTEVILLE RGNL/GRANNIS FIELD           | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ISO        | KINSTON REGL JETPORT AT STALLINGS FLD     | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LBT        | LUMBERTON MUNI                            | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LHZ        | TRIANGLE NORTH EXECUTIVE                  | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MQI        | DARE COUNTY RGNL                          | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GSO        | PIEDMONT TRIAD INTL                       | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SUT        | CAPE FEAR RGNL JETPORT/HOWIE FRANKLIN FLD | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VUJ        | STANLY COUNTY                             | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DPL        | DUPLIN COUNTY                             | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EDE        | NORTHEASTERN RGNL                         | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FQD        | RUTHERFORD CO/MARCHMAN FIELD              | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GWW        | WAYNE EXECUTIVE JETPORT                   | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HRJ        | HARNETT COUNTY                            | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IXA        | HALIFAX-NORTHAMPTON RGNL                  | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| JNX        | JOHNSTON COUNTY                           | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MRH        | MICHAEL J. SMITH FIELD                    | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MRN        | FOOTHILLS RGNL                            | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PMZ        | PLYMOUTH MUNI                             | NC             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| RCZ        | RICHMOND COUNTY                           | NC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CLT        | CHARLOTTE DOUGLAS INTL                    | NC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BAC        | BARNES COUNTY MUNI                        | ND             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 3               | 0.9988        |
| MOT        | MINOT INTL                                | ND             | LPV     | 1          | 0.9995   | 3           | 0.9994    | 4               | 0.9984        |

| Airport Id | Airport Name                        | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| D60        | TIOGA MUNI                          | ND             | LPV     | 1          | 0.9995   | 1           | 0.9990    | 4               | 0.9983        |
| JMS        | JAMESTOWN RGNL                      | ND             | LPV200  | 1          | 0.9995   | 2           | 0.9994    | 3               | 0.9989        |
| RUG        | RUGBY MUNI                          | ND             | LP      | 1          | 0.9995   | 2           | 0.9995    | 6               | 0.9987        |
| D55        | ROBERTSON FIELD                     | ND             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 5               | 0.9987        |
| FAR        | HECTOR INTL                         | ND             | LPV200  | 1          | 0.9994   | 1           | 0.9992    | 4               | 0.9990        |
| 5N8        | CASSELTON ROBERT MILLER RGNL        | ND             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 4               | 0.9989        |
| D09        | BOTTINEAU MUNI                      | ND             | LPV     | 1          | 0.9995   | 2           | 0.9993    | 5               | 0.9985        |
| DIK        | DICKINSON-THEODORE ROOSEVELT RGNL   | ND             | LPV200  | 2          | 0.9996   | 1           | 0.9991    | 4               | 0.9987        |
| GFK        | GRAND FORKS INTL                    | ND             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 4               | 0.9987        |
| S25        | WATFORD CITY MUNI                   | ND             | LPV     | 1          | 0.9995   | 1           | 0.9990    | 4               | 0.9984        |
| DVL        | DEVILS LAKE RGNL                    | ND             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 5               | 0.9988        |
| ISN        | SLOULIN FLD INTL                    | ND             | LPV200  | 1          | 0.9995   | 1           | 0.9990    | 4               | 0.9984        |
| 2C8        | CAVALIER MUNI                       | ND             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 5               | 0.9987        |
| BIS        | BISMARCK MUNI                       | ND             | LPV200  | 2          | 0.9995   | 2           | 0.9994    | 4               | 0.9988        |
| GAF        | HUTSON FIELD                        | ND             | LPV     | 1          | 0.9995   | 1           | 0.9992    | 4               | 0.9987        |
| GWR        | GWINNER-ROGER MELROE FIELD          | ND             | LPV200  | 1          | 0.9995   | 1           | 0.9993    | 3               | 0.9989        |
| HZE        | MERCER COUNTY RGNL                  | ND             | LPV     | 1          | 0.9995   | 1           | 0.9990    | 4               | 0.9986        |
| BWP        | HARRY STERN                         | ND             | LPV     | 1          | 0.9995   | 1           | 0.9993    | 4               | 0.9990        |
| 6K3        | CREIGHTON MUNI                      | NE             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9994        |
| 8V2        | STUART-ATKINSON MUNI                | NE             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9994        |
| CDR        | CHADRON MUNI                        | NE             | LPV200  | 0          | 1        | 3           | 0.9997    | 1               | 0.9991        |
| CZD        | COZAD MUNI                          | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ODX        | EVELYN SHARP FIELD                  | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| OLU        | COLUMBUS MUNI                       | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| ONL        | THE O'NEILL MUNI-JOHN L BAKER FIELD | NE             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9994        |
| RBE        | ROCK COUNTY                         | NE             | LPV     | 1          | 1        | 1           | 1         | 2               | 0.9994        |
| SWT        | SEWARD MUNICIPAL                    | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| TIF        | THOMAS COUNTY                       | NE             | LPV     | 1          | 1        | 1           | 1         | 3               | 0.9996        |
| 93Y        | DAVID CITY MUNI                     | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AUH        | AURORA MUNICIPAL - AL POTTER FIELD  | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BBW        | BROKEN BOW MUNI                     | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| GRN        | GORDON MUNI                         | NE             | LPV     | 0          | 1        | 2           | 0.9997    | 1               | 0.9992        |
| MCK        | MCCOOK RGNL                         | NE             | LPV     | 0          | 1        | 0           | 1         | 2               | 1             |
| OGA        | SEARLE FIELD                        | NE             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| FET        | FREMONT MUNI                        | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| GRI        | CENTRAL NEBRASKA RGNL               | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HDE        | BREWSTER FIELD                      | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HSI        | HASTINGS MUNI                       | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OMA        | EPPELEY AIRFIELD                    | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| VTN        | MILLER FIELD                        | NE             | LPV     | 1          | 1        | 1           | 1         | 2               | 0.9992        |
| OB4        | HARTINGTON MUNI                     | NE             | LPV     | 0          | 1        | 1           | 1         | 3               | 1             |
| 0V3        | PIONEER VILLAGE FIELD               | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 12K        | SUPERIOR MUNI                       | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4V9        | ANTELOPE COUNTY                     | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| LCG        | WAYNE MUNI                          | NE             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| 0C4        | PENDER MUNI                         | NE             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |

| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ANW        | AINSWORTH MUNI                            | NE             | LPV200  | 1          | 1        | 1           | 1         | 2               | 0.9994        |
| EAR        | KEARNEY RGNL                              | NE             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PMV        | PLATTSMOUTH MUNI                          | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| SNY        | SIDNEY MUNI/LLOYD W. CARR FIELD           | NE             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9995        |
|            | WESTERN NEB. RGNL/WILLIAM B. HEILIG FIELD |                |         |            |          |             |           |                 |               |
| BFF        | ALBION MUNI                               | NE             | LPV     | 0          | 1        | 1           | 1         | 6               | 0.9991        |
| BNV        | CRETE MUNICIPAL                           | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| FBY        | FAIRBURY MUNI                             | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JYR        | YORK MUNICIPAL                            | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LNK        | LINCOLN                                   | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 7V7        | RED CLOUD MUNI                            | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 9V5        | MODISSETT                                 | NE             | LPV     | 0          | 1        | 2           | 0.9997    | 1               | 0.9992        |
| BIE        | BEATRICE MUNI                             | NE             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FNB        | BRENNER FIELD                             | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IML        | IMPERIAL MUNI                             | NE             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9997        |
| MLE        | MILLARD                                   | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AFK        | NEBRASKA CITY MUNI                        | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AHQ        | WAHOO MUNI                                | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| AIA        | ALLIANCE MUNI                             | NE             | LPV200  | 0          | 1        | 1           | 1         | 5               | 0.9994        |
| FMZ        | FAIRMONT STATE AIRFIELD                   | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GGF        | GRANT MUNI                                | NE             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| IBM        | KIMBALL MUNI/ROBERT E ARRAJ FI            | NE             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9995        |
|            | NORTH PLATTE RGNL AIRPORT LEE BIRD FIELD  |                |         |            |          |             |           |                 |               |
| LBF        | LXN JIM KELLY FIELD                       | NE             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| OFK        | KARL STEFAN MEMORIAL                      | NE             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| OKS        | GARDEN COUNTY                             | NE             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9996        |
| 07K        | CENTRAL CITY MUNI-LARRY REINEKE FIELD     | NE             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
|            | ASH BOIRE FLD                             |                |         |            |          |             |           |                 |               |
| PSM        | PORTSMOUTH INTL AT PEASE                  | NH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LCI        | LACONIA MUNI                              | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CON        | CONCORD MUNI                              | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HIE        | MOUNT WASHINGTON RGNL                     | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MHT        | MANCHESTER                                | NH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LEB        | LEBANON MUNI                              | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EEN        | DILLANT-HOPKINS                           | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CNH        | CLAREMONT MUNI                            | NH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| DAW        | SKYHAVEN                                  | NH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 47N        | CENTRAL JERSEY RGNL                       | NJ             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| ACY        | ATLANTIC CITY INTL                        | NJ             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| WWD        | CAPE MAY COUNTY                           | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MMU        | MORRISTOWN MUNI                           | NJ             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| N14        | FLYING W                                  | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| N40        | SKY MANOR                                 | NJ             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 4N1        | GREENWOOD LAKE                            | NJ             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 39N        | PRINCETON                                 | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EWR        | NEWARK LIBERTY INTL                       | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                     | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|----------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| MIV        | MILLVILLE MUNI                   | NJ             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TEB        | TETERBORO                        | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VAY        | SOUTH JERSEY RGNL                | NJ             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| CDW        | ESSEX COUNTY                     | NJ             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TTN        | TRENTON MERCER                   | NJ             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CYDF       | Deer Lake                        | NL             | LPV     | 1          | 0.9999   | 2           | 0.9997    | 185             | 0.9885        |
| LAM        | LOS ALAMOS                       | NM             | LP      | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| ONM        | SOCORRO MUNI                     | NM             | LP      | 0          | 1        | 1           | 0.9999    | 4               | 0.9993        |
| ABQ        | ALBUQUERQUE INTL SUNPORT         | NM             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9996        |
| SRR        | SIERRA BLANCA RGNL               | NM             | LPV200  | 0          | 1        | 1           | 0.9999    | 1               | 0.9991        |
| FMN        | FOUR CORNERS RGNL                | NM             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| DMN        | DEMING MUNI                      | NM             | LPV     | 0          | 1        | 2           | 0.9993    | 1               | 0.9984        |
| SVC        | GRANT COUNTY                     | NM             | LPV     | 0          | 1        | 3           | 0.9997    | 2               | 0.9986        |
| HOB        | LEA COUNTY RGNL                  | NM             | LPV200  | 2          | 0.9999   | 2           | 0.9999    | 2               | 0.9991        |
| CNM        | CAVERN CITY AIR TRML             | NM             | LP      | 1          | 0.9995   | 2           | 0.9995    | 1               | 0.9987        |
| CVN        | CLOVIS MUNI                      | NM             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| ROW        | ROSWELL INTERNATIONAL AIR CENTER | NM             | LPV     | 2          | 0.9999   | 2           | 0.9999    | 2               | 0.9993        |
| CYHZ       | Halifax / Stanfield Intl         | NS             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| CYEV       | Inuvik                           | NT             | LPV     | 2          | 0.9999   | 2           | 0.9998    | 8               | 0.9989        |
| RTS        | RENO/STEAD                       | NV             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| TPH        | TONOPAH                          | NV             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| RNO        | RENO/TAHOE INTL                  | NV             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| WMC        | WINNEMUCCA MUNI                  | NV             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| LAS        | MC CARRAN INTL                   | NV             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| ELY        | ELY ARPT-YELLAND FLD             | NV             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| 9G0        | BUFFALO AIRFIELD                 | NY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| NY0        | FULTON COUNTY                    | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HPN        | WESTCHESTER COUNTY               | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PEO        | PENN YAN                         | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SLK        | ADIRONDACK RGNL                  | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OLE        | CATTARAUGUS COUNTY-OLEAN         | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| POU        | DUTCHESS COUNTY                  | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SWF        | STEWART INTL                     | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| VGC        | HAMILTON MUNI                    | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 44N        | SKY ACRES                        | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| D38        | CANANDAIGUA                      | NY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| FOK        | FRANCIS S. GABRESKI              | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ISP        | LONG ISLAND MAC ARTHUR           | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PBG        | PLATTSBURGH INTL                 | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 06N        | RANDALL                          | NY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 1B1        | COLUMBIA COUNTY                  | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ART        | WATERTOWN INTL                   | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BUF        | BUFFALO NIAGARA INTL             | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ELM        | ELMIRA/CORNING RGNL              | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FZY        | OSWEGO COUNTY                    | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| K09        | PISECO                           | NY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| SCH        | SCHEECTADY COUNTY                | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SDC        | WILLIAMSON-SODUS                 | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ELZ        | WELLSVILLE MUNI ARPT             | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                           | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| JHW        | CHAUTAUQUA COUNTY/JAMESTOWN            | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MSV        | SULLIVAN COUNTY INTL                   | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| N66        | ONEONTA MUNI                           | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ROC        | GREATER ROCHESTER INTL                 | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 4B6        | TICONDEROGA MUNI                       | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GVQ        | BATAVIA                                | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HWV        | BROOKHAVEN                             | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IAG        | NIAGARA FALLS INTL                     | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RME        | GRIFFISS INTL                          | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SYR        | SYRACUSE HANCOCK INTL                  | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ALB        | ALBANY INTL                            | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HTF        | HORNELL MUNI                           | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OGS        | OGDENSBURG INTL                        | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FRG        | REPUBLIC                               | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GFL        | FLOYD BENNETT MEMORIAL                 | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HTO        | EAST HAMPTON                           | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ITH        | ITHACA TOMPKINS RGNL                   | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JFK        | JOHN F KENNEDY INTL                    | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LGA        | LA GUARDIA                             | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 5B2        | SARATOGA COUNTY                        | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 5G0        | LE ROY                                 | NY             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 7G0        | LEDGEDALE AIRPARK                      | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MAL        | MALONE-DUFORT                          | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MGJ        | ORANGE COUNTY                          | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MSS        | MASSENA INTL-RICHARDS FIELD            | NY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BGM        | GREATER BINGHAMTON /EDWIN A LINK FIELD | NY             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TDZ        | TOLEDO EXECUTIVE                       | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| MGY        | DAYTON-WRIGHT BROTHERS                 | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CLE        | CLEVELAND-HOPKINS INTL                 | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LHQ        | FAIRFIELD COUNTY                       | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LNN        | WILLOUGHBY                             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MWO        | MIDDLETOWN REGIONAL/HOOK FIELD         | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TSO        | CARROLL COUNTY-TOLSON                  | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| UYF        | MADISON COUNTY                         | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 4I3        | KNOX COUNTY                            | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DLZ        | DELAWARE MUNI                          | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PMH        | GREATER PORTSMOUTH RGNL                | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RZT        | ROSS COUNTY                            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TOL        | TOLEDO EXPRESS                         | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TZR        | BOLTON FIELD                           | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 0G6        | WILLIAMS COUNTY                        | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CMH        | PORT COLUMBUS INTL                     | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HAO        | BUTLER CO RGNL                         | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LCK        | RICKENBACKER INTL                      | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LPR        | LORAIN COUNTY RGNL                     | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MNN        | MARION MUNI                            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MRT        | UNION COUNTY                           | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name             | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| OWX        | PUTNAM COUNTY            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
|            | OHIO UNIVERSITY SNYDER   |                |         |            |          |             |           |                 |               |
| UNI        | FIELD                    | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 1G0        | WOOD COUNTY              | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 1G3        | KENT STATE UNIV          | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BKL        | BROOKHAVEN               | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I68        | LEBANON-WARREN COUNTY    | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I69        | CLERMONT COUNTY          | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 16G        | SENECA COUNTY            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CQA        | LAKEFIELD                | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| EDJ        | BELLEFONTAINE RGNL       | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FDY        | FINDLAY                  | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| S24        | SANDUSKY COUNTY RGNL     | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SGH        | SPRINGFIELD-BECKLEY MUNI | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| USE        | FULTON COUNTY            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CAK        | AKRON-CANTON RGNL        | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FZI        | FOSTORIA METROPOLITAN    | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HZY        | ASHTABULA COUNTY         | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| I66        | CLINTON FIELD            | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ILN        | AIRBORNE AIRPARK         | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OSU        | OHIO STATE UNIVERSITY    | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OXD        | MIAMI UNIVERSITY         | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PHD        | HARRY CLEVER FIELD       | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 6G5        | BARNESVILLE-BRADFIELD    | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| AOH        | LIMA ALLEN COUNTY        | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AXV        | NEIL ARMSTRONG           | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CGF        | CUYAHOGA COUNTY          | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CXY        | CAPITAL CITY             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GQQ        | GALION MUNI              | OH             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
|            | GREENE COUNTY-LEWIS A    |                |         |            |          |             |           |                 |               |
| I19        | JACKSON RGNL             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MFD        | MANSFIELD LAHM RGNL      | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PCW        | CARL R KELLER FIELD      | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BJJ        | WAYNE COUNTY             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DAY        | JAMES M COX DAYTON INTL  | OH             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| I74        | GRIMES FIELD             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
|            | CINCINNATI MUNI AIRPORT- |                |         |            |          |             |           |                 |               |
| LUK        | LUNKEN FIELD             | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| YNG        | YOUNGSTOWN/WARREN RGNL   | OH             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OWP        | WILLIAM R. POGUE MUNI    | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PNC        | PONCA CITY RGNL          | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RCE        | CLARENCE E. PAGE MUNI    | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TUL        | TULSA INTL               | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
|            | ALTUS/QUARTZ MOUNTAIN    |                |         |            |          |             |           |                 |               |
| AXS        | RGNL                     | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CSM        | CLINTON-SHERMAN          | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GUY        | GUYMON MUNI              | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HSD        | SUNDANCE AIRPARK         | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WDG        | ENID WOODRING RGNL       | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ADH        | ADA MUNI                 | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CLK        | CLINTON RGNL             | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                      | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-----------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| TQH        | TAHLEQUAH MUNI                    | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WWR        | WEST WOODWARD                     | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BVO        | BARTLESVILLE MUNI                 | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| F22        | PERRY MUNI                        | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HBR        | HOBART MUNI                       | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OUN        | UNIVERSITY OF OKLAHOMA WESTHEIMER | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GCM        | CLAREMORE RGNL                    | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BKN        | BLACKWELL-TONKAWA MUNI            | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MKO        | DAVIS FIELD                       | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PVJ        | PAULS VALLEY MUNI                 | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RVS        | RICHARD LLOYD JONES JR            | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SWO        | STILLWATER RGNL                   | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 1F0        | ARDMORE DOWNTOWN EXECUTIVE        | OK             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| ADM        | ARDMORE MUNI                      | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| OKC        | WILL ROGERS WORLD                 | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SNL        | SHAWNEE RGNL                      | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DUA        | EAKER FIELD                       | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MLC        | MC ALESTER RGNL                   | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PWA        | WILEY POST                        | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 80F        | ANTLERS MUNI                      | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CHK        | CHICKASHA MUNI                    | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DUC        | HALLIBURTON FIELD                 | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ELK        | ELK CITY RGNL BUSINESS            | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FDR        | FREDERICK RGNL                    | OK             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GMJ        | GROVE MUNI                        | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GOK        | GUTHRIE-EDMOND RGNL               | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GZL        | STIGLER RGNL                      | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OKM        | OKMULGEE RGNL                     | OK             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYXL       | Sioux Lookout                     | ON             | LPV     | 1          | 0.9993   | 1           | 0.9992    | 6               | 0.9988        |
| CYHD       | Dryden Regional                   | ON             | LPV     | 1          | 0.9993   | 1           | 0.9992    | 5               | 0.9987        |
| CNS7       | Kincardine                        | ON             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYKF       | Kitchener / Waterloo              | ON             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYOW       | Ottawa / MacdonaldCartier Intl    | ON             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYTS       | Timmins / Victor M Power          | ON             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9996        |
| CYQT       | Thunder Bay                       | ON             | LPV     | 1          | 0.9993   | 1           | 0.9993    | 3               | 0.9992        |
| HIO        | PORTLAND-HILLSBORO                | OR             | LPV200  | 0          | 1        | 1           | 1         | 4               | 0.9989        |
| LGD        | LA GRANDE/UNION COUNTY            | OR             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9990        |
| AST        | ASTORIA RGNL                      | OR             | LPV     | 0          | 1        | 2           | 0.9998    | 2               | 0.9990        |
| ONO        | ONTARIO MUNI                      | OR             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9997        |
| UAO        | AURORA STATE                      | OR             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9991        |
| LMT        | KLAMATH FALLS                     | OR             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9995        |
| MMV        | MCMINNVILLE MUNI                  | OR             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9990        |
| S33        | MADRAS MUNICIPAL                  | OR             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9991        |
| SPB        | SCAPPOOSE INDUSTRIAL AIRPARK      | OR             | LPV     | 0          | 1        | 1           | 1         | 3               | 0.9989        |
| GCD        | GRANT CO RGNL/OGILVIE FIELD       | OR             | LPV     | 0          | 1        | 0           | 1         | 7               | 0.9993        |
| BDN        | BEND MUNI                         | OR             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9991        |
| EUG        | MAHLON SWEET FIELD                | OR             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9991        |

| Airport Id | Airport Name                         | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| CVO        | CORVALLIS MUNI                       | OR             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9991        |
| SLE        | MCNARY FLD                           | OR             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9991        |
| RDM        | ROBERTS FIELD                        | OR             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9991        |
| PDT        | EASTERN OREGON RGNL AT PENDLETON     | OR             | LPV200  | 0          | 1        | 0           | 1         | 7               | 0.9990        |
| PDX        | PORTLAND INTL                        | OR             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9989        |
| AOO        | ALTOONA-BLAIR COUNTY                 | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VVS        | JOSEPH A. HARDY CONNELLSVILLE        | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FKL        | VENANGO RGNL                         | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LNS        | LANCASTER                            | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LOM        | WINGS FIELD                          | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MDT        | HARRISBURG INTL                      | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OYM        | ST MARYS MUNI                        | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PIT        | PITTSBURGH INTL                      | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PSB        | MID STATE                            | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| THV        | YORK                                 | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| ABE        | LEHIGH VALLEY INTL                   | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BTP        | BUTLER COUNTY/K W SCHOLTER FLD       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HMZ        | BEDFORD COUNTY                       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IPT        | WILLIAMSPORT RGNL                    | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LBE        | ARNOLD PALMER RGNL                   | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| N79        | NORTHUMBERLAND COUNTY                | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PNE        | NORTHEAST PHILADELPHIA               | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WBW        | WILKES-BARRE WYOMING VALLEY          | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AXQ        | CLARION COUNTY                       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UCP        | NEW CASTLE MUNI                      | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UKT        | QUAKERTOWN                           | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 8G2        | CORRY-LAWRENCE                       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JST        | JOHN MURTHA JOHNSTOWN-CAMBRIA COUNTY | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| PHL        | PHILADELPHIA INTL                    | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RDG        | READING RGNL/CARL A SPAATZ FLD       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RVL        | MIFFLIN COUNTY                       | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| WAY        | GREENE COUNTY                        | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ZER        | SCHUYLKILL COUNTY JOE ZERBEY         | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AFJ        | WASHINGTON COUNTY                    | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AGC        | ALLEGHENY COUNTY                     | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| AVP        | WILKES-BARRE/SCRANTON INTL           | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FWQ        | ROSTRAYER                            | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 22N        | JAKE ARNER MEMORIAL                  | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 2G9        | SOMERSET COUNTY                      | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BVI        | BEAVER FALLS MUNI                    | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MQS        | CHESTER COUNTY G O CARLSON           | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UNV        | UNIVERSITY PARK                      | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                                 | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| XLL        | ALLENTOWN-QUEEN CITY MUNI                    | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 8N8        | DANVILLE                                     | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 9D4        | DECK   | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DUJ        | DUBOIS RGNL                                  | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FIG        | CLEARFIELD-LAWRENCE                          | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GKJ        | PORT MEADVILLE                               | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| MPO        | POCONO MOUNTAINS MUNI                        | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BFD        | BRADFORD RGNL                                | PA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HZL        | HAZLETON MUNI                                | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| N38        | WELLSBORO JOHNSTON                           | PA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| ERI        | ERIE INTL/TOM RIDGE FIELD                    | PA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYEW       | Amos   | QC             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| CSR3       | Victoriaville                                | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYIF       | StAugustin                                   | QC             | LPV     | 2          | 0.9999   | 2           | 0.9996    | 107             | 0.9945        |
| CYMX       | Montreal (Mirabel Intl)                      | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYRQ       | TroisRivieres                                | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYQB       | Quebec / Jean Lesage Intl                    | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYYY       | MontJoli                                     | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYVB       | Bonaventure                                  | QC             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| CPN8       | Opinaca                                      | QC             | LPV     | 2          | 0.9998   | 2           | 0.9996    | 4               | 0.9989        |
| CTP9       | Kattiniq / Donaldson                         | QC             | LPV     | 2          | 0.9994   | 4           | 0.9989    | 79              | 0.9936        |
| CYRI       | RiviereduLoup                                | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYVP       | Kuujjuaq                                     | QC             | LPV     | 4          | 0.9993   | 3           | 0.9988    | 28              | 0.9965        |
| CYHU       | Montreal / StHubert                          | QC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BID        | BLOCK ISLAND STATE                           | RI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OQU        | QUONSET STATE                                | RI             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PVD        | THEODORE FRANCIS GREEN STATE                 | RI             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ARW        | BEAUFORT COUNTY                              | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SMS        | SUMTER                                       | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| JZI        | CHARLESTON EXECUTIVE                         | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GGE        | GEORGETOWN COUNTY                            | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DYB        | SUMMERTON                                    | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CRE        | GRAND STRAND                                 | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CDN        | WOODWARD FIELD                               | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BNL        | BARNWELL RGNL                                | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| UZA        | ROCK HILL/YORK CO/BRYANT FIELD               | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HYW        | CONWAY-HORRY COUNTY                          | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FDW        | FAIRFIELD COUNTY                             | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CHS        | CHARLESTON AFB/INTL                          | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GSP        | GREENVILLE-SPARTANBURG INTL - ROGER MILLIKEN | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GMU        | GREENVILLE DOWNTOWN                          | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DCM        | CHESTER CATAWBA RGNL                         | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OGB        | ORANGEBURG MUNI                              | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GYH        | DONALDSON CENTER                             | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AIK        | AIKEN MUNI                                   | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SPA        | SPARTANBURG DOWNTOWN MEMORIAL                | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                            | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| UDG        | DARLINGTON COUNTY JETPORT               | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RBW        | LOWCOUNTRY RGNL                         | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MYR        | MYRTLE BEACH INTL                       | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MKS        | BERKELEY COUNTY                         | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FLO        | FLORENCE RGNL                           | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LQK        | PICKENS COUNTY                          | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LRO        | MT PLEASANT RGNL-FAISON FIELD           | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BBP        | MARLBORO COUNTY JETPORT-H E AVENT FIELD | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 6J0        | LEXINGTON COUNTY AT PELION              | SC             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AND        | ANDERSON RGNL                           | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CEU        | OCONEE COUNTY RGNL                      | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LKR        | LANCASTER COUNTY-MC WHIRTER FIELD       | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CAE        | COLUMBIA METROPOLITAN                   | SC             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BKX        | BROOKINGS RGNL                          | SD             | LPV     | 1          | 0.9999   | 2           | 0.9995    | 2               | 0.9989        |
| FSD        | JOE FOSS FIELD                          | SD             | LPV200  | 0          | 1        | 2           | 0.9997    | 2               | 0.9991        |
| PIR        | PIERRE RGNL                             | SD             | LPV     | 2          | 0.9998   | 1           | 0.9994    | 1               | 0.9990        |
| ATY        | WATERTOWN RGNL                          | SD             | LPV200  | 1          | 0.9997   | 1           | 0.9994    | 3               | 0.9990        |
| 49B        | STURGIS MUNI                            | SD             | LPV     | 1          | 1        | 2           | 0.9993    | 1               | 0.9991        |
| MDS        | MADISON MUNI                            | SD             | LPV     | 1          | 0.9999   | 2           | 0.9995    | 2               | 0.9990        |
| YKN        | CHAN GURNEY MUNI                        | SD             | LPV200  | 0          | 1        | 1           | 1         | 3               | 0.9993        |
| SPF        | BLACK HILLS-CLYDE ICE FIELD             | SD             | LPV     | 0          | 1        | 2           | 0.9993    | 2               | 0.9991        |
| ABR        | ABERDEEN RGNL                           | SD             | LPV200  | 1          | 0.9995   | 1           | 0.9992    | 3               | 0.9989        |
| MBG        | MOBRIDGE MUNI                           | SD             | LPV     | 1          | 0.9993   | 2           | 0.9993    | 1               | 0.9989        |
| HON        | HURON RGNL                              | SD             | LPV200  | 1          | 0.9999   | 2           | 0.9996    | 2               | 0.9991        |
| EFC        | BELLE FOURCHE MUNI                      | SD             | LPV     | 1          | 1        | 2           | 0.9993    | 2               | 0.9991        |
| VMR        | HAROLD DAVIDSON FIELD                   | SD             | LPV     | 0          | 1        | 1           | 1         | 3               | 0.9995        |
| 9D1        | GREGORY MUNI - FLYNN FIELD              | SD             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9992        |
| 0D8        | GETTYSBURG MUNI                         | SD             | LPV200  | 1          | 0.9994   | 1           | 0.9994    | 1               | 0.9990        |
| MHE        | MITCHELL MUNI                           | SD             | LPV     | 1          | 1        | 2           | 0.9996    | 2               | 0.9991        |
| MKA        | MILLER MUNI                             | SD             | LPV200  | 1          | 0.9997   | 2           | 0.9994    | 2               | 0.9991        |
| RAP        | RAPID CITY RGNL                         | SD             | LPV200  | 0          | 1        | 3           | 0.9994    | 1               | 0.9991        |
| ICR        | WINNER RGNL                             | SD             | LPV     | 0          | 1        | 1           | 0.9999    | 2               | 0.9992        |
| HSR        | HOT SPRINGS MUNI                        | SD             | LP      | 0          | 1        | 2           | 0.9996    | 1               | 0.9991        |
| CKQ8       | McArthur River                          | SK             | LPV     | 2          | 0.9993   | 3           | 0.9986    | 7               | 0.9972        |
| CYKJ       | Key Lake                                | SK             | LPV     | 3          | 0.9993   | 3           | 0.9988    | 9               | 0.9972        |
| FYM        | FAYETTEVILLE MUNI                       | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BNA        | NASHVILLE INTL                          | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MEM        | MEMPHIS INTL                            | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RKW        | ROCKWOOD MUNI                           | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FYE        | FAYETTE CO                              | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GKT        | GATLINBURG-PIGEON FORGE                 | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M91        | SPRINGFIELD ROBERTSON COUNTY            | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MKL        | MC KELLAR-SIPES RGNL                    | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MOR        | MOORE-MURRELL                           | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PHT        | HENRY COUNTY                            | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

| Airport Id | Airport Name                      | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-----------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| SNH        | SAVANNAH-HARDIN COUNTY            | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SYI        | BOMAR FIELD-SHELBYVILLE MUNI      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TRI        | TRI-CITIES RGNL TN/VA             | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| UCY        | EVERETT-STEWART RGNL              | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CKV        | OUTLAW FIELD                      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MQY        | SMYRNA                            | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MRC        | MAURY COUNTY                      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| NQA        | MILLINGTON RGNL JETPORT           | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PVE        | BEECH RIVER RGNL                  | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BGF        | WINCHESTER MUNI                   | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CSV        | CROSSVILLE MEMORIAL-WHITSON FIELD | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DKX        | KNOXVILLE DOWNTOWN ISLAND         | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SRB        | UPPER CUMBERLAND RGNL             | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| SZY        | ROBERT SIBLEY                     | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GZS        | ABERNATHY FIELD                   | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M01        | GENERAL DEWITT SPAIN              | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MBT        | MURFREESBORO MUNI                 | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| TYS        | MCGHEE-TYSON                      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 0A3        | SMITHVILLE MUNI                   | TN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 1A3        | MARTIN CAMPBELL FIELD             | TN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 0M3        | JOHN A BAKER                      | TN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| CHA        | LOVELL FIELD                      | TN             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LUG        | ELLINGTON                         | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M33        | SUMNER COUNTY RGNL                | TN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 0M4        | BENTON COUNTY                     | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 1M5        | PORTLAND MUNI                     | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 2A0        | MARK ANTON                        | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 2M8        | CHARLES W. BAKER                  | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DYR        | DYERSBURG RGNL                    | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JWN        | JOHN C. TUNE                      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MMI        | MCMINN COUNTY                     | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| THA        | TULLAHOMA RGNL/WM NORTHERN FLD    | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 0M5        | HUMPHREYS COUNTY                  | TN             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| 3M7        | LAFAYETTE MUNI                    | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| M54        | LEBANON MUNI                      | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HZD        | CARROLL COUNTY                    | TN             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ADS        | ADDISON                           | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AFW        | FORT WORTH ALLIANCE               | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| ALI        | ALICE INTERNATIONAL               | TX             | LPV     | 1          | 0.9994   | 4           | 0.9992    | 4               | 0.9983        |
| ARM        | WHARTON RGNL                      | TX             | LPV     | 1          | 0.9998   | 1           | 0.9998    | 4               | 0.9994        |
| ASL        | HARRISON COUNTY                   | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BAZ        | NEW BRAUNFELS MUNI                | TX             | LPV     | 1          | 0.9997   | 1           | 0.9997    | 5               | 0.9993        |
| DRT        | DEL RIO INTL                      | TX             | LPV     | 2          | 0.9992   | 3           | 0.9990    | 5               | 0.9986        |
| DWH        | DAVID WAYNE HOOKS MEMORIAL        | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| E01        | ROY HURD MEMORIAL                 | TX             | LP      | 1          | 0.9995   | 2           | 0.9994    | 2               | 0.9988        |
| EDC        | AUSTIN EXECUTIVE                  | TX             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9995        |

| Airport Id | Airport Name                        | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ELA        | EAGLE LAKE                          | TX             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9995        |
| GYI        | NORTH TEXAS RGNL/PERRIN FIELD       | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HDO        | HONDO MUNI                          | TX             | LPV     | 1          | 0.9996   | 4           | 0.9995    | 4               | 0.9989        |
| LBB        | LUBBOCK PRESTON SMITH INTL          | TX             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| LFK        | ANGELINA COUNTY                     | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| MAF        | MIDLAND INTL                        | TX             | LPV200  | 2          | 0.9999   | 2           | 0.9999    | 2               | 0.9990        |
| MNZ        | HAMILTON MUNI                       | TX             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9998        |
| PIL        | PORT ISABEL-CAMERON COUNTY          | TX             | LPV     | 1          | 0.9990   | 2           | 0.9987    | 4               | 0.9981        |
| SJT        | SAN ANGELO RGNL/MATHIS FLD          | TX             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9994        |
| T41        | LA PORTE MUNI                       | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| TKI        | COLLIN COUNTY RGNL AT MC KINNEY     | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| TYR        | TYLER POUNDS RGNL                   | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| 2F5        | LAMESA MUNI                         | TX             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9995        |
| 50R        | LOCKHART MUNI                       | TX             | LPV     | 1          | 1        | 1           | 1         | 5               | 0.9994        |
| 5C1        | BOERNE STAGE FIELD                  | TX             | LP      | 1          | 0.9996   | 2           | 0.9996    | 5               | 0.9992        |
| DAL        | DALLAS LOVE FIELD                   | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| DKR        | HOUSTON COUNTY                      | TX             | LP      | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| GLE        | GAINESVILLE MUNI                    | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JAS        | JASPER COUNTY-BELL FIELD            | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| JWY        | MID-WAY RGNL                        | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| RAS        | MUSTANG BEACH                       | TX             | LPV     | 1          | 0.9995   | 2           | 0.9995    | 3               | 0.9984        |
| RKP        | ARANSAS COUNTY                      | TX             | LPV     | 1          | 0.9995   | 2           | 0.9995    | 3               | 0.9984        |
| UTS        | HUNTSVILLE MUNI                     | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9999        |
| BPT        | SOUTHEAST TEXAS RGNL                | TX             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| BRO        | BROWNSVILLE/SOUTH PADRE ISLAND INTL | TX             | LP      | 1          | 0.9990   | 2           | 0.9986    | 4               | 0.9981        |
| CLL        | EASTERWOOD FIELD                    | TX             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| DUX        | MOORE COUNTY                        | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| FST        | FT. STOCKTON-PECOS COUNTY           | TX             | LPV     | 1          | 0.9995   | 2           | 0.9992    | 3               | 0.9987        |
| LLN        | LEVELLAND MUNI                      | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| SAT        | SAN ANTONIO INTL                    | TX             | LPV200  | 1          | 0.9996   | 2           | 0.9996    | 5               | 0.9992        |
| SLR        | SULPHUR SPRINGS MUNI                | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| T59        | WHEELER MUNI                        | TX             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| TRL        | TERRELL MUNI                        | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| 11R        | BRENHAM MUNI                        | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| 3T5        | FAYETTE RGNL AIR CENTER             | TX             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9994        |
| 45R        | HAWTHORNE FIELD                     | TX             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| AXH        | HOUSTON-SOUTHWEST                   | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9995        |
| BKD        | STEPHEN'S COUNTY                    | TX             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| CFD        | COULTER FIELD                       | TX             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| CXO        | LONE STAR EXECUTIVE                 | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| ELP        | EL PASO INTL                        | TX             | LP      | 2          | 0.9997   | 2           | 0.9993    | 2               | 0.9984        |
| ERV        | KERRVILLE MUNI/LOUIS SCHREINER FLD  | TX             | LPV     | 1          | 0.9996   | 2           | 0.9996    | 5               | 0.9992        |
| ETN        | EASTLAND MUNI                       | TX             | LP      | 0          | 1        | 0           | 1         | 2               | 1             |

| Airport Id | Airport Name                       | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| FTW        | FORT WORTH MEACHAM INTL            | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GGG        | EAST TEXAS RGNL                    | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| GKY        | ARLINGTON MUNI                     | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| HQZ        | MESQUITE METRO                     | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LHB        | HEARNE MUNI                        | TX             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| PEQ        | PECOS MUNI                         | TX             | LPV200  | 1          | 0.9995   | 2           | 0.9994    | 2               | 0.9988        |
| PPA        | PERRY LEFORS FIELD                 | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| PVW        | HALE COUNTY                        | TX             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| VCT        | VICTORIA RGNL                      | TX             | LPV200  | 1          | 0.9996   | 2           | 0.9996    | 4               | 0.9992        |
| ABI        | ABILENE RGNL                       | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| CRP        | CORPUS CHRISTI INTL                | TX             | LPV200  | 1          | 0.9995   | 3           | 0.9993    | 4               | 0.9983        |
| E11        | ANDREWS COUNTY                     | TX             | LPV     | 2          | 1        | 2           | 1.0000    | 2               | 0.9991        |
| E30        | BRUCE FIELD                        | TX             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9996        |
| EBG        | EDINBURG INTL                      | TX             | LPV     | 2          | 0.9990   | 2           | 0.9987    | 4               | 0.9981        |
| F05        | WILBARGER COUNTY                   | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GRK        | ROBERT GRAY AAF                    | TX             | LPV200  | 0          | 1        | 0           | 1         | 6               | 0.9997        |
| HBV        | JIM HOGG COUNTY                    | TX             | LPV     | 2          | 0.9992   | 2           | 0.9986    | 4               | 0.9982        |
| HOU        | WILLIAM P HOBBY                    | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| INJ        | HILLSBORO MUNI                     | TX             | LPV     | 0          | 1        | 0           | 1         | 2               | 1             |
| LXY        | MEXIA-LIMESTONE CO                 | TX             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9999        |
| MFE        | MC ALLEN MILLER INTL               | TX             | LPV     | 2          | 0.9989   | 2           | 0.9986    | 4               | 0.9980        |
| PSX        | PALACIOS MUNI                      | TX             | LPV     | 1          | 0.9996   | 1           | 0.9996    | 3               | 0.9993        |
| RBO        | NUECES COUNTY                      | TX             | LP      | 1          | 0.9994   | 3           | 0.9993    | 4               | 0.9983        |
| SWW        | AVENGER FIELD                      | TX             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| T82        | GILLESPIE COUNTY                   | TX             | LPV     | 2          | 1        | 2           | 1         | 5               | 0.9993        |
| XBP        | BRIDGEPORT MUNI                    | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 5T9        | MAVERICK COUNTY MEMORIAL INTL      | TX             | LPV     | 2          | 0.9992   | 3           | 0.9990    | 5               | 0.9985        |
| ACT        | WACO RGNL                          | TX             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9999        |
| 6R3        | CLEVELAND MUNI                     | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| BYY        | BAY CITY MUNI                      | TX             | LPV     | 1          | 0.9997   | 1           | 0.9997    | 3               | 0.9993        |
| CNW        | TSTC WACO                          | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9999        |
| COM        | COLEMAN MUNI                       | TX             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9997        |
| FWS        | FORT WORTH SPINKS                  | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| GDJ        | GRANBURY RGNL                      | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GNC        | GAINES COUNTY                      | TX             | LPV     | 1          | 1        | 1           | 1         | 3               | 0.9993        |
| HRL        | VALLEY INTL                        | TX             | LPV200  | 2          | 0.9990   | 2           | 0.9987    | 4               | 0.9981        |
| JSO        | CHEROKEE COUNTY                    | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| LRD        | LAREDO INTL                        | TX             | LPV200  | 3          | 0.9992   | 2           | 0.9986    | 4               | 0.9982        |
| MDD        | MIDLAND AIRPARK                    | TX             | LPV     | 2          | 0.9999   | 2           | 0.9999    | 3               | 0.9992        |
| OCH        | A L MANGHAM JR RGNL                | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| RBD        | DALLAS EXECUTIVE                   | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| RYW        | LAGO VISTA TX - RUSTY ALLEN        | TX             | LP      | 0          | 1        | 0           | 1         | 5               | 0.9994        |
| T78        | LIBERTY MUNI                       | TX             | LP      | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| TME        | HOUSTON EXECUTIVE                  | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| TPL        | DRAUGHON-MILLER CENTRAL TEXAS RGNL | TX             | LPV200  | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| AMA        | RICK HUSBAND AMARILLO INTL         | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| BWD        | BROWNWOOD RGNL                     | TX             | LPV     | 0          | 1        | 0           | 1         | 4               | 0.9998        |
| DFW        | DALLAS-FT WORTH INTL               | TX             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

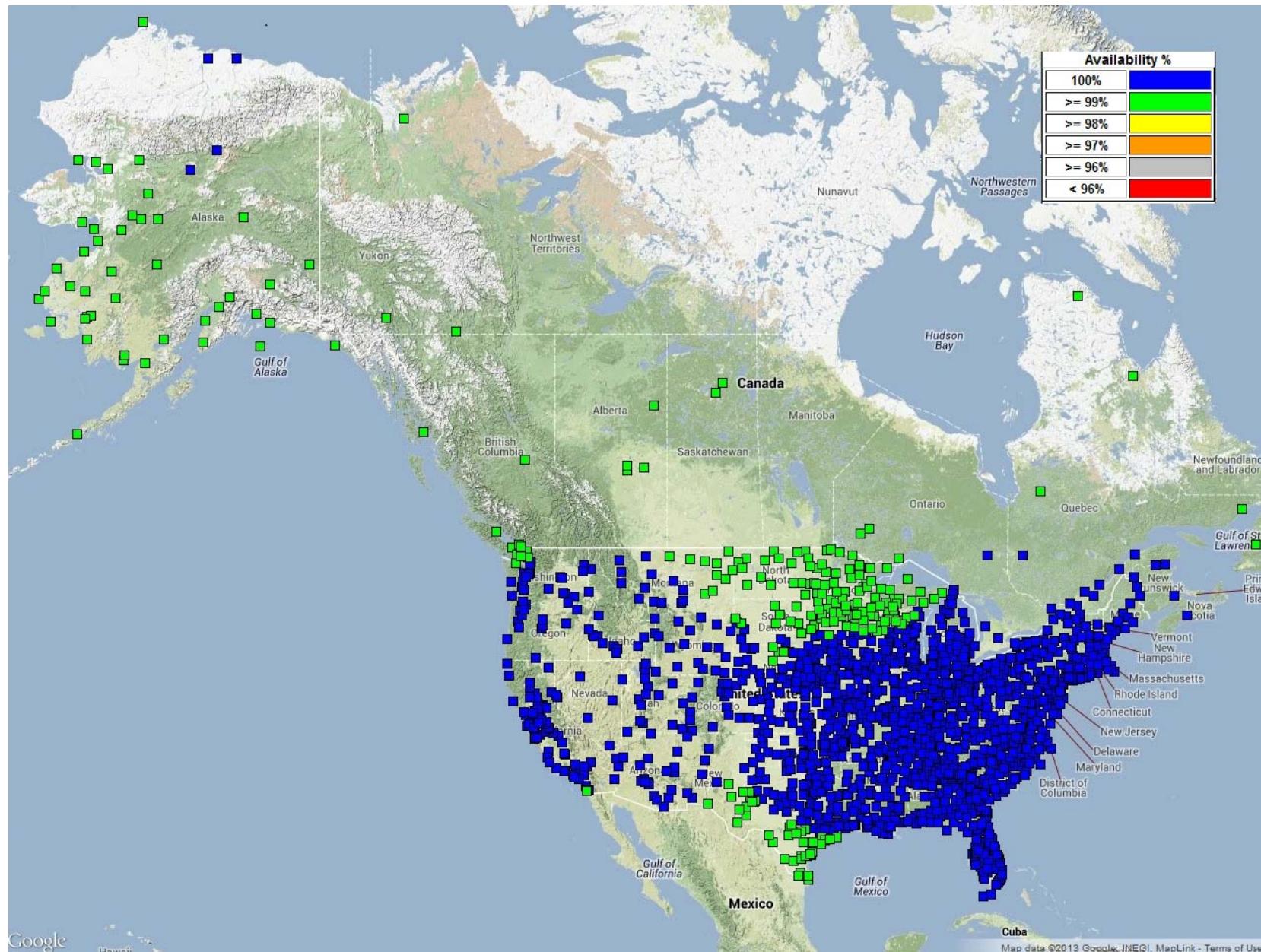
| Airport Id | Airport Name                         | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|--------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| E38        | ALPINE-CASPARIS MUNICIPAL            | TX             | LP      | 2          | 0.9993   | 2           | 0.9992    | 5               | 0.9985        |
| EFD        | ELLINGTON FIELD                      | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| HRX        | HEREFORD MUNI                        | TX             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
|            | GEORGE BUSH INTERCONTINENTAL/HOUSTON | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| LBX        | BRAZORIA COUNTY                      | TX             | LPV     | 1          | 0.9999   | 1           | 0.9999    | 3               | 0.9995        |
| LUD        | DECATUR MUNI                         | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PRX        | COX FIELD                            | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SGR        | SUGAR LAND RGNL                      | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| TFP        | T P MC CAMPBELL                      | TX             | LPV     | 1          | 0.9995   | 3           | 0.9995    | 3               | 0.9984        |
| 77F        | WINTERS MUNI                         | TX             | LP      | 0          | 1        | 0           | 1         | 4               | 0.9997        |
| AUS        | AUSTIN-BERGSTROM INTL                | TX             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9994        |
| BPG        | BIG SPRING MC MAHON-WRINKLE          | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9995        |
| DTO        | DENTON MUNI                          | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| E19        | GRUVER MUNI                          | TX             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| F00        | JONES FIELD                          | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| GLS        | SCHOLES INTL AT GALVESTON            | TX             | LPV200  | 1          | 1        | 1           | 1         | 3               | 0.9995        |
| GVT        | MAJORS                               | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| IKG        | KLEBERG COUNTY                       | TX             | LPV     | 1          | 0.9994   | 3           | 0.9990    | 4               | 0.9982        |
| IWS        | WEST HOUSTON                         | TX             | LP      | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| LNC        | LANCASTER                            | TX             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| LVJ        | PEARLAND RGNL                        | TX             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| ODO        | ODESSA-SCHLEMEYER FIELD              | TX             | LPV200  | 2          | 0.9998   | 2           | 0.9998    | 3               | 0.9990        |
| ONY        | OLNEY MUNI                           | TX             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ORG        | ORANGE COUNTY                        | TX             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| SNK        | WINSTON FIELD                        | TX             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| 2R9        | KARNES COUNTY                        | TX             | LP      | 1          | 0.9996   | 2           | 0.9995    | 5               | 0.9990        |
| 8F3        | CROSBYTON MUNICIPAL                  | TX             | LP      | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| BBD        | CURTIS FIELD                         | TX             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9994        |
| FOM        | FILLMORE MUNI                        | UT             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| SGU        | ST GEORGE MUNI                       | UT             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| U55        | PANGUITCH MUNI                       | UT             | LPV200  | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| VEL        | VERNAL                               | UT             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| BCE        | BRYCE CANYON                         | UT             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9998        |
| PVU        | PROVO MUNI                           | UT             | LPV200  | 0          | 1        | 0           | 1         | 1               | 1             |
| LGU        | LOGAN-CACHE                          | UT             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| OGD        | OGDEN-HINCKLEY                       | UT             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| SLC        | SALT LAKE CITY INTL                  | UT             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| U14        | NEPHI MUNI                           | UT             | LPV     | 0          | 1        | 0           | 1         | 1               | 1             |
| BDG        | BLANDING MUNI                        | UT             | LPV     | 0          | 1        | 0           | 1         | 3               | 1             |
| ENV        | WENDOVER                             | UT             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| BMC        | BRIGHAM CITY                         | UT             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| PUC        | CARBON COUNTY RGNL/BUCK DAVIS FIELD  | UT             | LP      | 0          | 1        | 0           | 1         | 1               | 1             |
| DTA        | DELTA MUNI                           | UT             | LP      | 0          | 1        | 0           | 1         | 1               | 0.9999        |
| FCI        | CHESTERFIELD COUNTY                  | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PTB        | DINWIDDIE COUNTY                     | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HLX        | TWIN COUNTY                          | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OKV        | WINCHESTER RGNL                      | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RIC        | RICHMOND INTL                        | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |

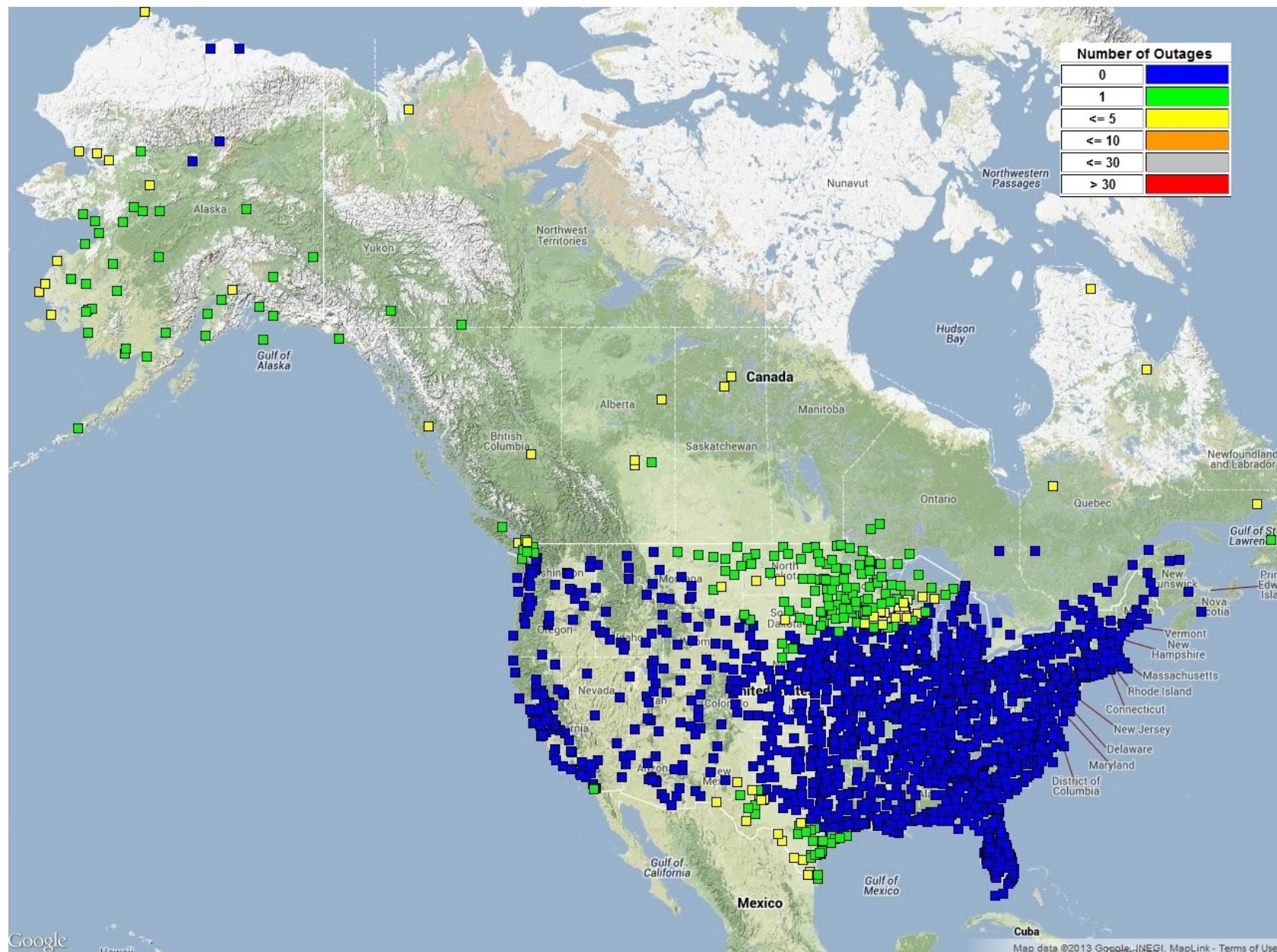
| Airport Id | Airport Name                        | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ROA        | ROANOKE RGNL/WOODRUM FIELD          | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| VJI        | VIRGINIA HIGHLANDS                  | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| W63        | MARKS MUNI                          | VA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| HSP        | INGALLS FIELD                       | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| ORF        | NORFOLK INTL                        | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 8W2        | NEW MARKET                          | VA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| CHO        | CHARLOTTESVILLE-ALBEMARLE           | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LYH        | LYNCHBURG RGNL/PRESTON GLENN FLD    | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MFV        | ACCOMACK COUNTY                     | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PSK        | NEW RIVER VALLEY                    | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RMN        | STAFFORD RGNL                       | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SFQ        | SUFFOLK EXECUTIVE                   | VA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| DAN        | DANVILLE RGNL                       | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| EMV        | EMPORIA-GREENSVILLE RGNL            | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| JYO        | LEESBURG EXECUTIVE                  | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| OFP        | HANOVER COUNTY MUNI                 | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PHF        | NEWPORT NEWS/WILLIAMSBURG INTL      | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FKN        | FRANKLIN MUN-JOHN BEVERLY ROSE      | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LNP        | LONESOME PINE                       | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| AVC        | MECKLENBURG-BRUNSWICK RGNL          | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| SHD        | SHENANDOAH VALLEY RGNL              | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CPK        | CHESAPEAKE RGNL                     | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| FVX        | FARMVILLE RGNL                      | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HWY        | WARRENTON-FAUQUIER                  | VA             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MKJ        | MOUNTAIN EMPIRE                     | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| W78        | WILLIAM M TUCK                      | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| XSA        | TAPPAHANNOCK-ESSEX COUNTY           | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| 0VG        | LEE COUNTY                          | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BCB        | VIRGINIA TECH /MONTGOMERY EXECUTIVE | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| JFZ        | TAZEWELL COUNTY                     | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LUA        | LURAY CAVERNS                       | VA             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| MTV        | BLUE RIDGE                          | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CJR        | CULPEPER RGNL                       | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FYJ        | MIDDLE PENINSULA RGNL               | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| LKU        | LOUISA COUNTY/FREEMAN FIELD         | VA             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| FSO        | FRANKLIN COUNTY STATE               | VT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MPV        | EDWARD F KNAPP STATE                | VT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| BTV        | BURLINGTON INTL                     | VT             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| RUT        | RUTLAND-SOUTHERN VERMONT RGNL       | VT             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| PWT        | BREMERTON NATIONAL                  | WA             | LPV     | 0          | 1        | 2           | 0.9994    | 3               | 0.9987        |
| OTH        | SOUTHWEST OREGON RGNL               | WA             | LPV     | 0          | 1        | 0           | 1         | 14              | 0.9991        |

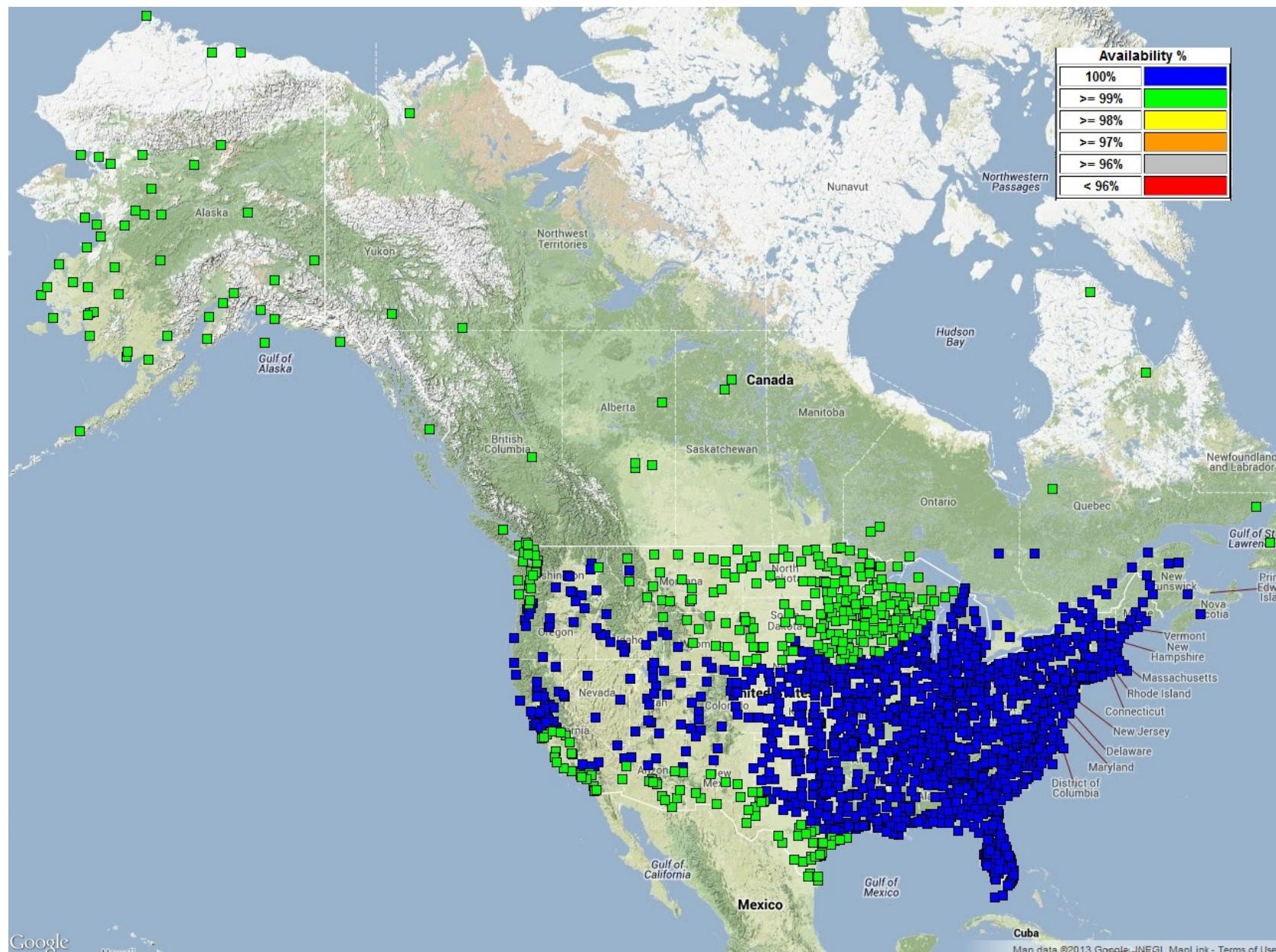
| Airport Id | Airport Name                          | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---------------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| FHR        | FRIDAY HARBOR                         | WA             | LPV     | 1          | 0.9999   | 2           | 0.9992    | 5               | 0.9983        |
| GEG        | SPOKANE INTL                          | WA             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9985        |
| MWH        | GRANT CO INTL                         | WA             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9986        |
| PAE        | SNOHOMISH COUNTY (PAINE FLD)          | WA             | LPV200  | 0          | 1        | 2           | 0.9995    | 5               | 0.9985        |
| SEA        | SEATTLE-TACOMA INTL                   | WA             | LPV200  | 0          | 1        | 2           | 0.9996    | 3               | 0.9986        |
| ALW        | WALLA WALLA RGNL                      | WA             | LPV     | 0          | 1        | 0           | 1         | 6               | 0.9987        |
| TIW        | TACOMA NARROWS                        | WA             | LPV     | 0          | 1        | 3           | 0.9998    | 2               | 0.9986        |
| CLM        | WILLIAM R FAIRCHILD INTL              | WA             | LPV     | 1          | 0.9999   | 2           | 0.9992    | 4               | 0.9985        |
| CLS        | CHEHALIS-CENTRALIA                    | WA             | LPV     | 0          | 1        | 2           | 0.9999    | 3               | 0.9988        |
| PSC        | TRI-CITIES                            | WA             | LPV200  | 0          | 1        | 0           | 1         | 6               | 0.9988        |
| RLD        | RICHLAND                              | WA             | LPV     | 0          | 1        | 0           | 1         | 6               | 0.9988        |
| TDO        | ED CARLSON MEMORIAL - SOUTH LEWIS CO  | WA             | LPV     | 0          | 1        | 2           | 0.9999    | 3               | 0.9989        |
| YKM        | YAKIMA AIR TERMINAL /MCALLISTER FIELD | WA             | LPV200  | 0          | 1        | 0           | 1         | 5               | 0.9987        |
| EPH        | EPHRATA MUNI                          | WA             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9986        |
| HQM        | BOWERMAN                              | WA             | LPV200  | 0          | 1        | 3           | 0.9995    | 2               | 0.9987        |
| OLM        | OLYMPIA RGNL                          | WA             | LPV     | 0          | 1        | 3           | 0.9998    | 2               | 0.9987        |
| RNT        | RENTON MUNI                           | WA             | LPV     | 0          | 1        | 2           | 0.9996    | 3               | 0.9985        |
| DEW        | DEER PARK                             | WA             | LPV     | 0          | 1        | 0           | 1         | 6               | 0.9985        |
| BLI        | BELLINGHAM INTL                       | WA             | LPV200  | 1          | 0.9999   | 2           | 0.9992    | 5               | 0.9983        |
| BVS        | SKAGIT RGNL                           | WA             | LPV     | 1          | 0.9999   | 2           | 0.9994    | 4               | 0.9983        |
| AWO        | ARLINGTON MUNI                        | WA             | LPV200  | 0          | 1        | 2           | 0.9995    | 4               | 0.9983        |
| PVB        | PLATTEVILLE MUNICIPAL                 | WI             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9996        |
| HYR        | SAWYER COUNTY                         | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| PBH        | PRICE COUNTY                          | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| RCX        | RUSK COUNTY                           | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| SUW        | RICHARD I BONG                        | WI             | LP      | 1          | 0.9994   | 1           | 0.9993    | 3               | 0.9992        |
| C29        | MIDDLETON MUNI-MOREY FIELD            | WI             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9995        |
| CWA        | CENTRAL WISCONSIN                     | WI             | LPV200  | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| EGV        | EAGLE RIVER UNION                     | WI             | LPV     | 1          | 0.9993   | 1           | 0.9993    | 1               | 0.9993        |
| MRJ        | IOWA COUNTY                           | WI             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9995        |
| OSH        | WITTMAN RGNL                          | WI             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| PCZ        | WAUPACA MUNI                          | WI             | LPV     | 1          | 1.0000   | 1           | 0.9994    | 1               | 0.9993        |
| RPD        | RICE LAKE RGNL - CARL'S FIELD         | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| RRL        | MERRILL MUNI                          | WI             | LPV     | 2          | 0.9998   | 1           | 0.9994    | 1               | 0.9993        |
| SUE        | DOOR COUNTY CHERRYLAND                | WI             | LPV     | 0          | 1        | 1           | 1         | 1               | 0.9994        |
| VIQ        | NEILLSVILLE MUNI                      | WI             | LPV     | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| 8D1        | NEW HOLSTEIN MUNI                     | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| ASX        | JOHN F. KENNEDY MEMORIAL              | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9993        |
| ENW        | KENOSHA RGNL                          | WI             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| ETB        | WEST BEND MUNI                        | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| LNR        | TRI-COUNTY RGNL                       | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| MKE        | GENERAL MITCHELL INTL                 | WI             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| MTW        | MANITOWOC COUNTY                      | WI             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| SBM        | SHEBOYGAN COUNTY MEMORIAL             | WI             | LPV200  | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| TKV        | TOMAHAWK RGNL                         | WI             | LP      | 2          | 0.9996   | 1           | 0.9994    | 1               | 0.9993        |

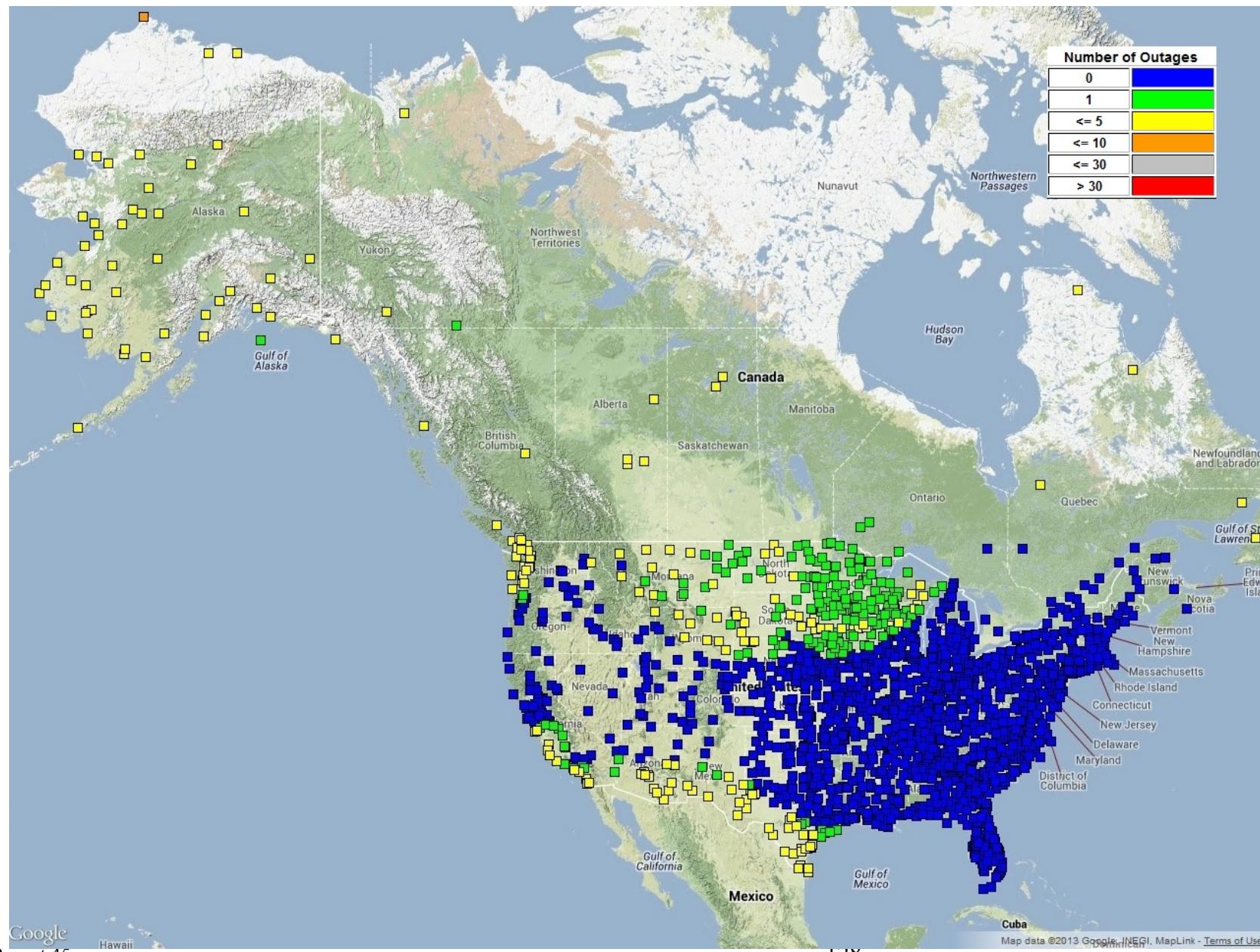
| Airport Id | Airport Name                              | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|---|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| ATW        | OUTAGAMIE COUNTY RGNL                     | WI             | LPV200  | 0          | 1        | 1           | 0.9998    | 1               | 0.9993        |
| RNH        | NEW RICHMOND RGNL                         | WI             | LPV     | 1          | 0.9994   | 1           | 0.9993    | 2               | 0.9992        |
| ARV        | LAKELAND/NOBLE F. LEE MEMORIAL FIELD      | WI             | LPV     | 1          | 0.9993   | 1           | 0.9993    | 1               | 0.9993        |
| FLD        | FOND DU LAC COUNTY                        | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9993        |
| LUM        | MENOMONIE MUNICIPAL-SCORE FIELD           | WI             | LPV     | 2          | 0.9997   | 1           | 0.9994    | 2               | 0.9993        |
| UNU        | DODGE COUNTY                              | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9993        |
| 57C        | EAST TROY MUNI                            | WI             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| DLL        | BARABOO WISCONSIN DELLS                   | WI             | LPV     | 0          | 1        | 1           | 1.0000    | 1               | 0.9993        |
| EZS        | SHAWANO MUNI                              | WI             | LPV     | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| GRB        | AUSTIN STRAUBEL INTL                      | WI             | LPV200  | 0          | 1        | 1           | 0.9998    | 1               | 0.9993        |
| MDZ        | TAYLOR COUNTY                             | WI             | LPV     | 2          | 0.9998   | 1           | 0.9994    | 1               | 0.9993        |
| RAC        | JOHN H. BATTEN                            | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9998        |
| STE        | STEVENS POINT MUNI                        | WI             | LPV200  | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| AUW        | WAUSAU DOWNTOWN                           | WI             | LPV200  | 2          | 0.9998   | 1           | 0.9994    | 1               | 0.9993        |
| C35        | REEDSBURG MUNI                            | WI             | LP      | 0          | 1        | 1           | 0.9999    | 1               | 0.9993        |
| HXF        | HARTFORD MUNI                             | WI             | LPV     | 0          | 1        | 0           | 1         | 1               | 0.9994        |
| JVL        | SOUTHERN WISCONSIN RGNL                   | WI             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| MFI        | MARSHFIELD MUNI                           | WI             | LPV     | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| OCQ        | J DOUGLAS BAKE MEML                       | WI             | LP      | 1          | 1        | 2           | 0.9997    | 1               | 0.9993        |
| RHI        | RHINELANDER-ONEIDA COUNTY                 | WI             | LPV200  | 2          | 0.9996   | 1           | 0.9994    | 1               | 0.9993        |
| UES        | WAUKESHA COUNTY                           | WI             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9996        |
| Y50        | WAUTOMA MUNI                              | WI             | LP      | 0          | 1        | 2           | 0.9996    | 1               | 0.9993        |
| 82C        | MAUSTON-NEW LISBON UNION                  | WI             | LP      | 0          | 1        | 2           | 0.9996    | 1               | 0.9993        |
| BCK        | BLACK RIVER FALLS AREA                    | WI             | LPV     | 2          | 0.9999   | 1           | 0.9994    | 1               | 0.9993        |
| CLI        | CLINTONVILLE MUNI                         | WI             | LPV     | 2          | 1        | 1           | 0.9994    | 1               | 0.9993        |
| CMY        | SPARTA/FORT MC COY                        | WI             | LPV     | 1          | 1        | 1           | 0.9994    | 1               | 0.9993        |
| EAU        | CHIPPEWA VALLEY RGNL                      | WI             | LPV200  | 2          | 0.9997   | 1           | 0.9994    | 1               | 0.9993        |
| LSE        | LA CROSSE MUNI                            | WI             | LPV     | 1          | 1        | 1           | 0.9994    | 1               | 0.9993        |
| MSN        | DANE COUNTY RGNL-TRUAX FIELD              | WI             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9995        |
| MWC        | LAWRENCE J TIMMERMANN                     | WI             | LPV     | 0          | 1        | 0           | 1         | 2               | 0.9997        |
| OVS        | BOSCOBEL                                  | WI             | LPV     | 0          | 1        | 1           | 0.9999    | 1               | 0.9994        |
| I18        | JACKSON COUNTY                            | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| CRW        | YEAGER                                    | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BKW        | RALEIGH COUNTY MEMORIAL                   | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| 3I2        | MASON COUNTY                              | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| W22        | UPSHUR COUNTY RGNL                        | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HTS        | TRI-STATE/MILTON J. FERGUSON FIELD        | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| MRB        | EASTERN WV RGNL/SHEPHERD                  | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| MGW        | MORGANTOWN MUNI-WALTER L. BILL HART FIELD | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| LWB        | GREENBRIER VALLEY                         | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CKB        | NORTH CENTRAL WEST VIRGINIA               | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| HLG        | WHEELING OHIO CO                          | WV             | LPV200  | 0          | 1        | 0           | 1         | 0               | 1             |
| BLF        | MERCER COUNTY                             | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |

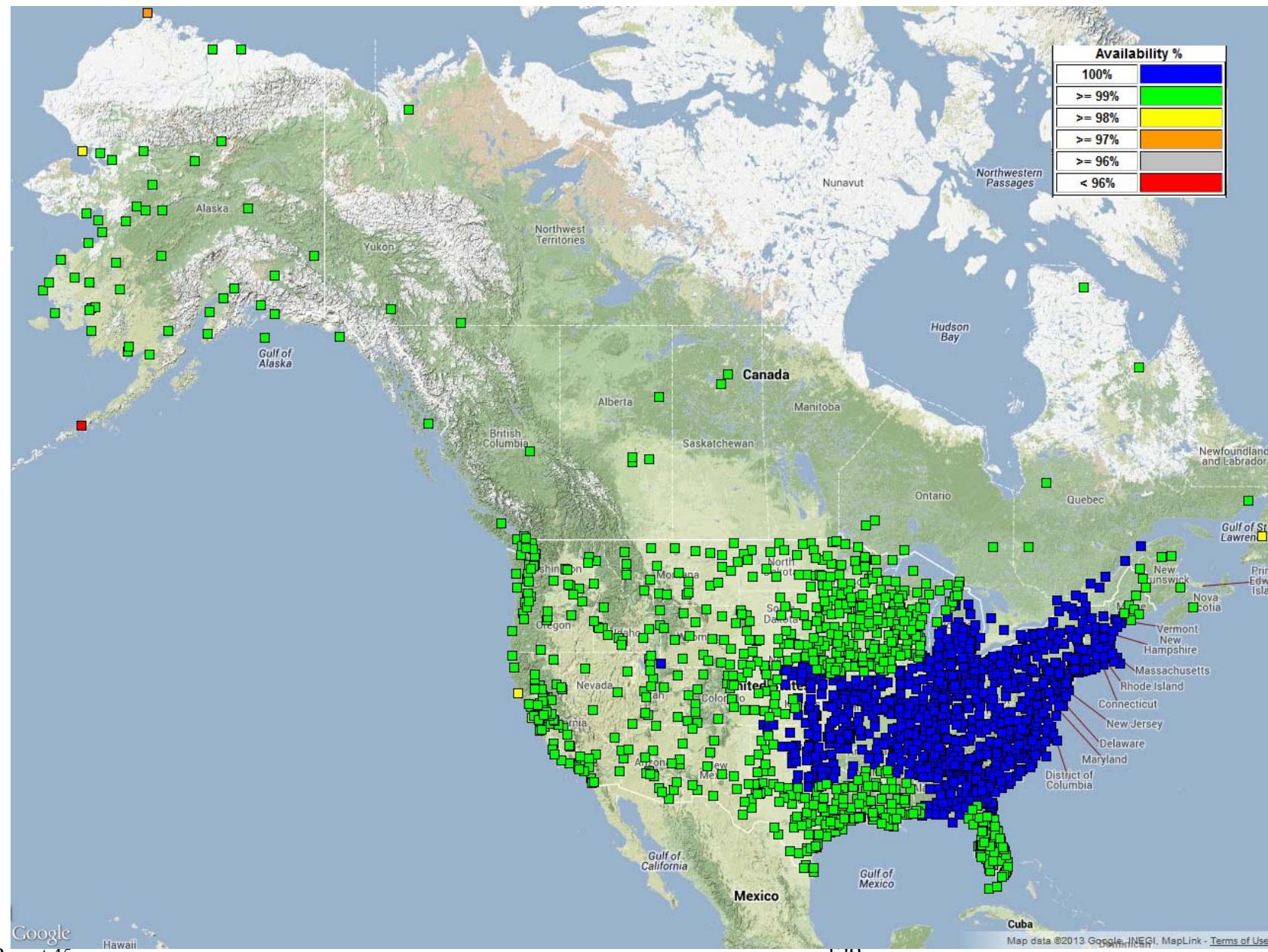
| Airport Id | Airport Name                      | State/Provence | Service | LP Outages | LP Avail | LPV Outages | LPV Avail | LPV 200 Outages | LPV 200 Avail |
|------------|-----------------------------------|----------------|---------|------------|----------|-------------|-----------|-----------------|---------------|
| SXL        | SUMMERSVILLE                      | WV             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| USW        | BOGGS FIELD                       | WV             | LP      | 0          | 1        | 0           | 1         | 0               | 1             |
| PKB        | MID-OHIO VALLEY RGNL              | WV             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| CYS        | CHEYENNE RGNL/JERRY OLSON FIELD   | WY             | LPV     | 0          | 1        | 0           | 1         | 5               | 0.9996        |
| SAA        | SHIVELY FIELD                     | WY             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9997        |
| EVW        | EVANSTON-UINTA COUNTY BURNS FIELD | WY             | LPV     | 0          | 1        | 0           | 1         | 0               | 1             |
| DGW        | CONVERSE COUNTY                   | WY             | LPV200  | 0          | 1        | 2           | 0.9998    | 3               | 0.9992        |
| SHR        | SHERIDAN COUNTY                   | WY             | LPV     | 0          | 1        | 1           | 0.9994    | 4               | 0.9991        |
| CPR        | NATRONA COUNTY INTL               | WY             | LPV     | 0          | 1        | 2           | 0.9998    | 3               | 0.9992        |
| COD        | YELLOWSTONE RGNL                  | WY             | LPV     | 0          | 1        | 2           | 0.9997    | 5               | 0.9990        |
| RKS        | ROCK SPRINGS-SWEETWATER COUNTY    | WY             | LPV200  | 0          | 1        | 0           | 1         | 2               | 0.9998        |
| RIW        | RIVERTON RGNL                     | WY             | LPV200  | 0          | 1        | 2           | 1         | 3               | 0.9993        |
| LAR        | LARAMIE RGNL                      | WY             | LPV     | 0          | 1        | 0           | 1         | 6               | 0.9996        |
| WRL        | WORLAND MUNI                      | WY             | LPV     | 0          | 1        | 2           | 0.9997    | 5               | 0.9991        |
| JAC        | JACKSON HOLE                      | WY             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| ECS        | MONDELL FIELD                     | WY             | LPV     | 0          | 1        | 1           | 0.9994    | 2               | 0.9991        |
| 7V6        | CAMP GUERNSEY                     | WY             | LP      | 0          | 1        | 2           | 0.9998    | 6               | 0.9992        |
| GCC        | GILLETTE-CAMPBELL COUNTY          | WY             | LPV     | 0          | 1        | 2           | 0.9995    | 4               | 0.9992        |
| PNA        | RALPH WENZ FIELD                  | WY             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9995        |
| RWL        | RAWLINS MUNI/HARVEY FIELD         | WY             | LPV     | 0          | 1        | 0           | 1         | 3               | 0.9996        |
| CYQH       | Watson Lake                       | YT             | LPV     | 1          | 0.9999   | 1           | 0.9999    | 4               | 0.9985        |
| CYXY       | Whitehorse / Erik Nielsen Intl    | YT             | LPV     | 1          | 0.9998   | 2           | 0.9997    | 3               | 0.9986        |

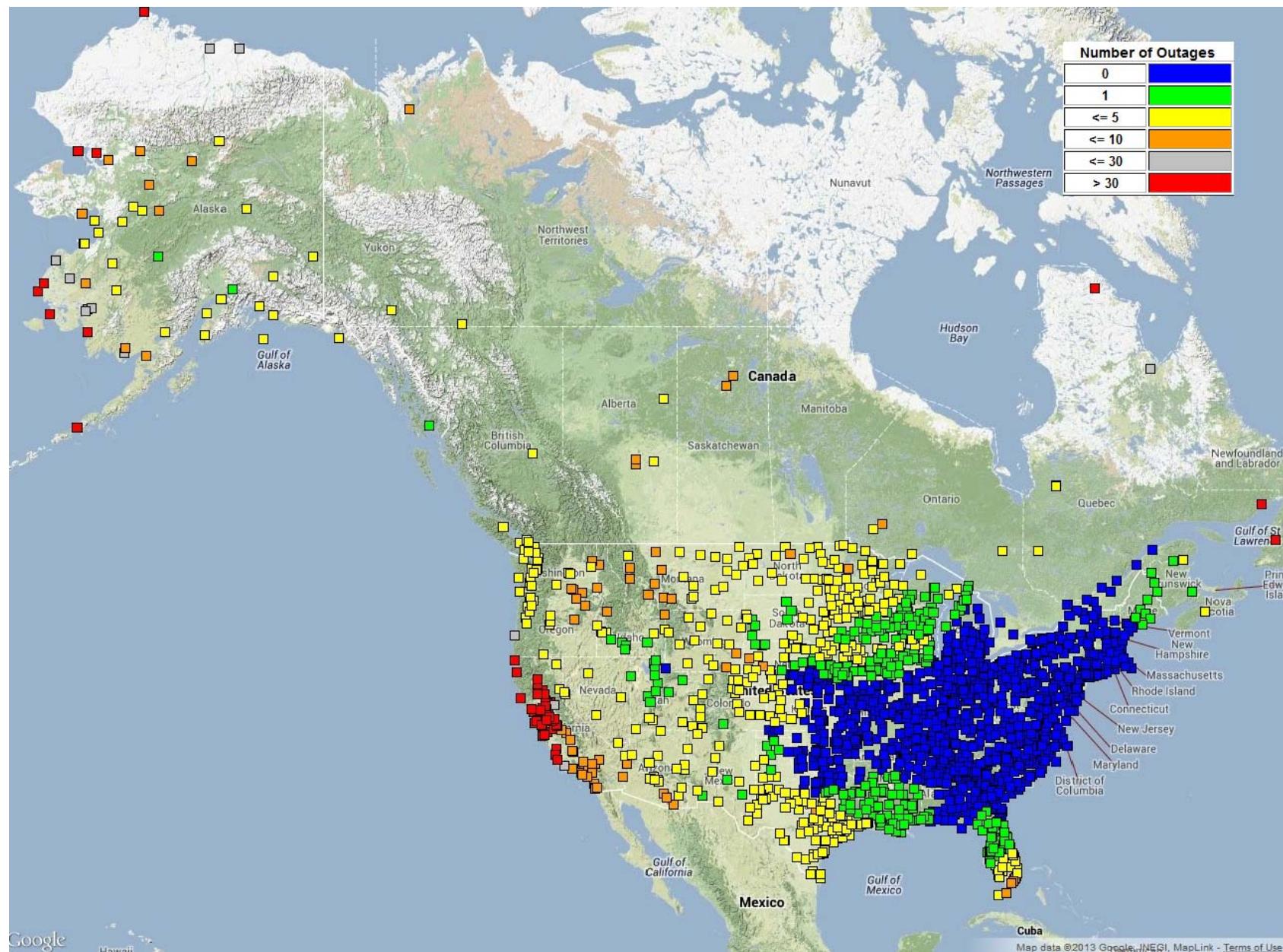
**Figure 8-1 WAAS LP Availability at Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

**Figure 8-2 WAAS LP Outages at Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

**Figure 8-3 WAAS LPV Availability Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

**Figure 8-4 WAAS LPV Outages at Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

**Figure 8-5 WAAS LPV 200 Availability at Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

**Figure 8-6 WAAS LPV 200 Outages at Airports in the US and Canada with GPS RNAV Instrument Approach Procedures**

## **9.0 WAAS DETERMINISTIC CODE NOISE AND MULTIPATH (CNMP) BOUNDING ANALYSIS**

WAAS utilizes a deterministic model to estimate the residual CNMP noise after the application of standard dual frequency carrier smoothing techniques to minimize the effects of multipath and code noise. This analysis performs an assessment of how well that deterministic model bounds the actual errors. This analysis is periodically performed as part of the WAAS Test Team's off-line monitoring to ensure that there are no drastic detrimental changes to the multipath environment at the WAAS Reference Stations (WRSSs). This analysis also ensures that WAAS system is not indefinitely exposed to conspiring receiver failure symptoms that would invalidate the CNMP bounding estimate in a manner that would exceed the assumption that no more than one reference station is conspiring to deceive the WAAS monitors at any time by underestimating the residual measurement noise the safety monitors. Although some failures mechanisms that cause CNMP bounding issues are occasionally seen, no "conspiring" errors have ever been detected. That is, data has caused the safety monitors to trip unnecessarily versus missing a necessary trip.

The analysis post processes measurement data to estimate the pseudorange code to carrier ambiguity for each entire arc of measurements for each satellite pass. The ambiguity estimate is then used to level the carrier measurement. The leveled carrier is then used as a multipath free truth estimate. The WAAS real time deterministic CNMP smoothing algorithm is then applied to the original measurements. The difference between the smoothed measurements and the leveled truth measurements is compared to the deterministic noise estimates. Only arcs with continuous carrier phase greater in length than 7200 seconds are utilized for this analysis to minimize the impacts of non-zero mean multipath biasing the truth estimates. The WAAS dual frequency cycle slip detector algorithm is used to detect any discontinuities in the carrier phase.

Statistics are calculated on how well the 0.1 multiples of the deterministically estimated standard deviation bounds the difference between the leveled truth and the real time smoothed measurements. Those statistics are then compared to a theoretical Gaussian distribution and an extensive set of plots are generated and manually reviewed. Table 9-1 recaps the results of that manual analysis.

Table 9-1 CNMP Bounding Statistics

| WAAS Site    | WRE | Jul 12 | Aug 12 | Sep 12 | Oct 12 | Nov 12 | Dec 12 | Jan 13 | Feb 13 | Mar 13 | Apr 13 | May 13 | Jun 13 |
|--------------|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Albuquerque  | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Anchorage    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Atlanta      | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Barrow       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Bethel       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Billings     | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Boston       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Chicago      | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Cleveland    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Cold Bay     | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Dallas       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Denver       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Fairbanks    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Gander       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Goose Bay    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Honolulu     | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Houston      | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Iqaluit      | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Jacksonville | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Juneau       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|              | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |

| WAAS Site         | WRE | Jul 12 | Aug 12 | Sep 12 | Oct 12 | Nov 12 | Dec 12 | Jan 13 | Feb 13 | Mar 13 | Apr 13 | May 13 | Jun 13 |
|-------------------|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Kansas City       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Kotzebue          | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Los Angeles       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Memphis           | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Merida            | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Mexico City       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Miami             | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Minneapolis       | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| New York          | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Oakland           | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Puerto Vallarta   | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Salt Lake City    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| San Jose Del Cabo | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| San Juan          | A   | —      | —      | —      | —      | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | —      | —      | —      | —      | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | —      | —      | —      | —      | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Seattle           | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Tapachula         | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Washington, DC    | A   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
| Winnipeg          | A   | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | B   | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |
|                   | C   | —      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      | ●      |

- Excellent -  $3.29\sigma$  bounded 100%
- Good -  $4\sigma$  bounded 100%
- Fair -  $4\sigma$  bounded 100% with one worst satellite excluded (Requires manual review if symptoms repeat from month to month)
- Poor – Requires manual review
- No data available

## **10.0 WAAS REFERENCE STATION SURVEY VALIDATION**

Antenna L1 phase center position surveys were performed for all the WAAS Reference Station antennas using 25 hour sets of data from 23:00 on 6/28/13 to 23:59:30 on 6/29/13 with the exception of Mexico City thread B (MMX2). MMX2 has been off line since 3/17/12. The 6/29/13 location for MMX2 was estimated by adjusting the 3/16/13 MMX height by the amount of subsidence that was observed between 3/16/13 and 6/29/13 on the MMX1 and MMX3 antennas (-0.072 m) and then recalculating the ECEF coordinates from the geographic coordinates.

Duplicate surveys were performed using both the National Geodetic Survey (NGS) Online Positioning User Service (OPUS) and the Canadian Spatial Reference System (CSRS) Precise Point Positioning (PPP) service. The IGS08 reference frame is used for the OPUS solutions. The value of -0.4445 meters was used for the antenna reference point (ARP) to antenna phase center (APC) offset for the MicroPulse MPL-WAAS-2225W WAAS antennas in the processing.

The overall RMS quality metrics reported by OPUS were all <= 2.5 cm. The CSRS surveys' RSSs of the reported ECEF sigmas for the 6/29/13 data set were all <= 10 mm. The OPUS and CSRS surveys for the 6/29/13 data set agreed to an average of 1.4 cm., with a standard deviation of 5 mm. The maximum of difference was 2.6 cm. for San Juan Puerto Rico thread A (ZSU1).

The OPUS positions were compared to the positions in WAAS software Release 3B1 (Build W6.016) which was installed during March 2013. The next release of WAAS software is Release 4.0 (Build W7.006) which is to be fielded later this year. The antenna positions in Release 3B1 were checked against the positions in Release 4.0 and were verified to be identical. The OPUS surveys agree with the Release 3B1 / Release 4 positions to better or equal than 5.9 cm. The maximum was MTP1, Tapachula Mexico thread A.

The "take action" threshold established by the WAAS Integrity Performance Panel (WIPP) is 25 cm. for Mexico City and 10 cm. for the remaining sites. The large MMX difference is caused by subsidence.

Table 11-1 lists the WAAS antenna L1 phase center positions as of 6/29/13. The positions are the OPUS estimated positions in IGS08. MMX2 is the 3/16/13 position adjusted for subsidence.

Figures 11-1 to 11-3 show the RSS of the ECEF differences between the 6/29/13 OPUS survey antenna phase center locations and the locations in the WAAS Releases 3B1 & 4 software. Each reference station has three independent strings of WAAS receiving equipment (WRE). A surveyed antenna phase center location is required for each WRE. All three strings of a reference station are shown in the three figures. For example, BET1 identifies the RSS of the ECEF deltas for the Bethel WRE string 1(A). The next two bars in the chart are Bethel string 2(B) and Bethel string 3(C). Figure 11-4 to 11-6 show the OPUS surveys overall RMS quality indications.

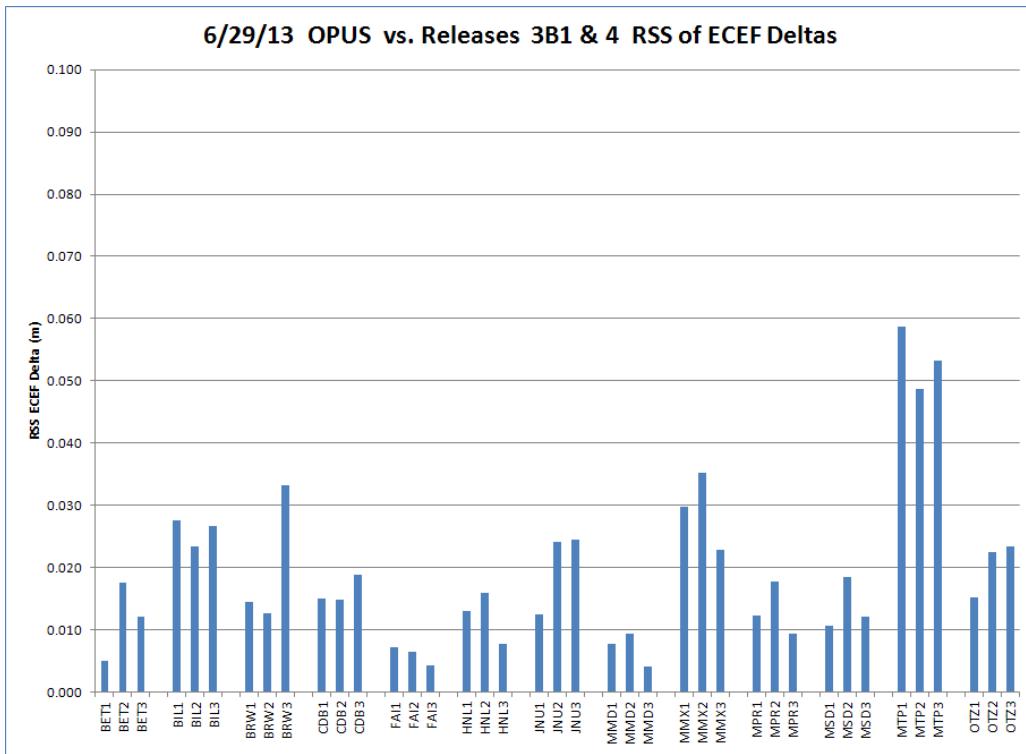
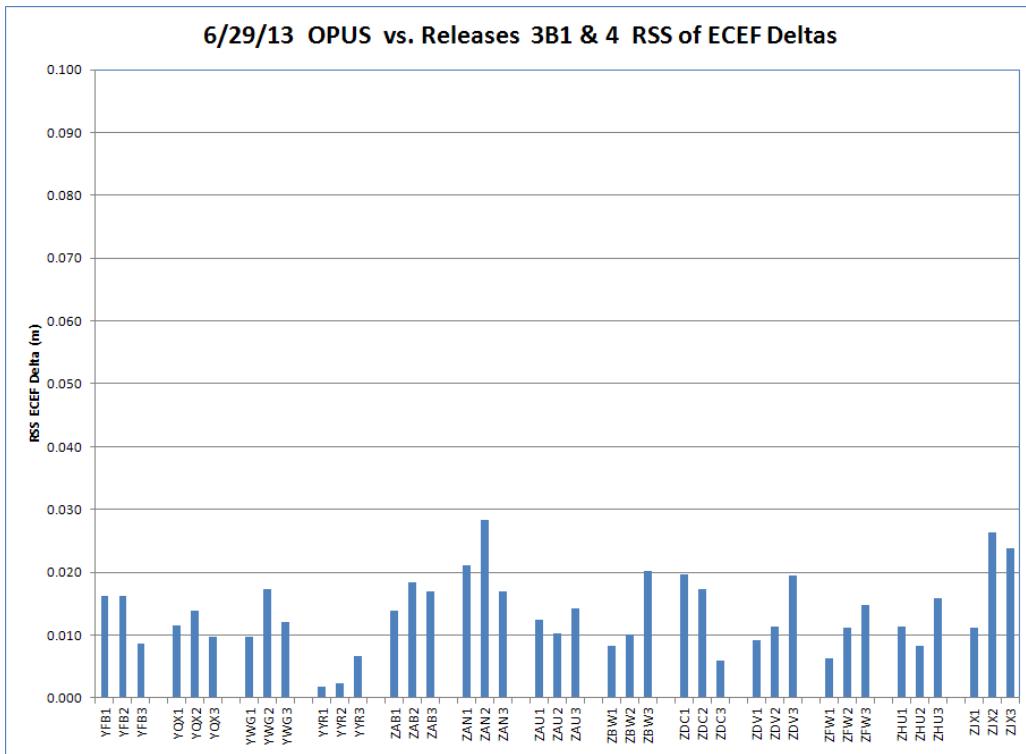
Figures 11-7 to 11-9 show the RSS of the ECEF difference between the positions obtained from OPUS and the positions obtained from CSRS. Note that that OPUS positions are in IGS08 and the CSRS positions are in ITRF-2008. Figures 11-10 to 11-12 show the RSS of the ECEF sigma's survey qualities reported by CSRS.

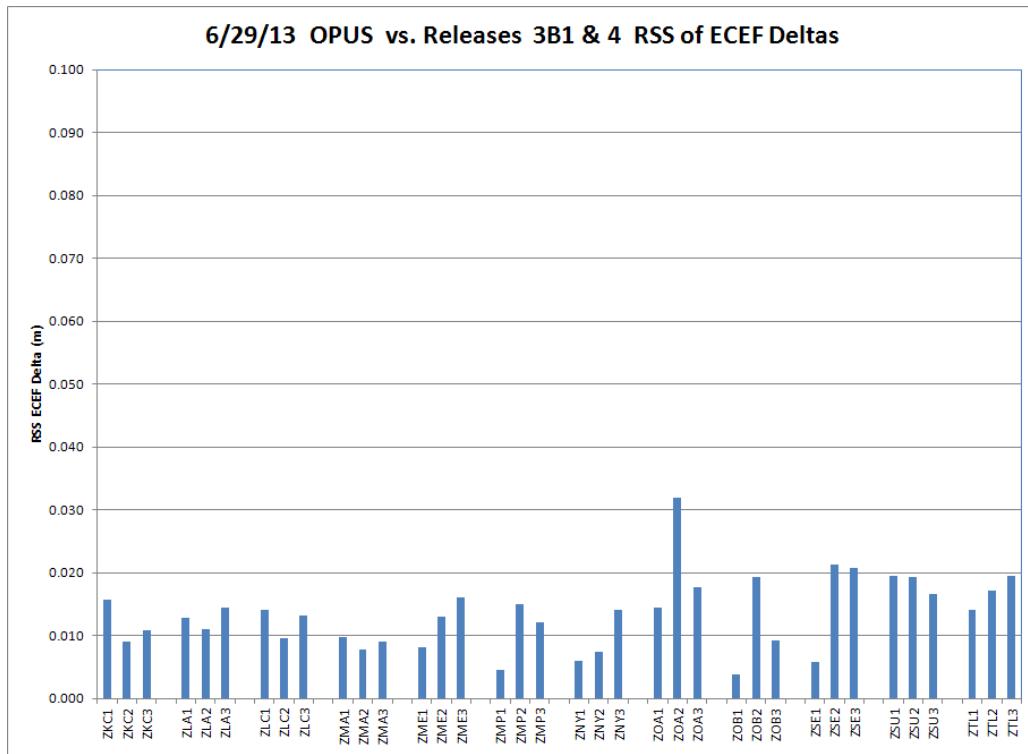
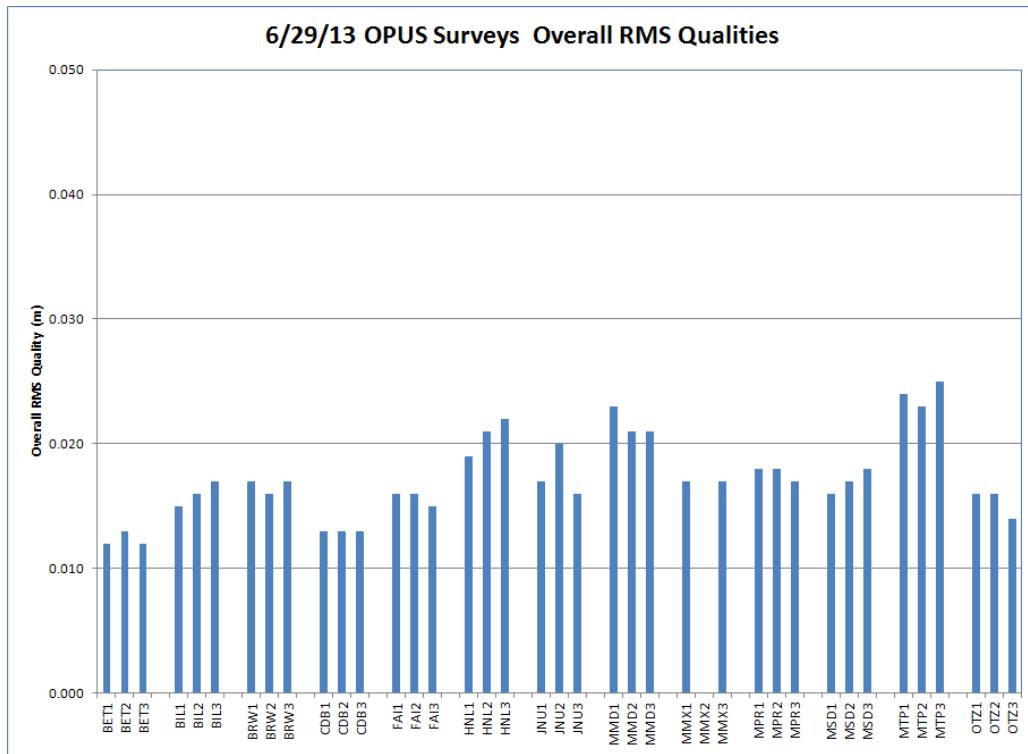
**Table 10-1 WAAS Antenna Positions (OPUS IGS08) as of 9/29/12**

| <b>WRE</b> | <b>X(m)</b>  | <b>Y(m)</b>  | <b>Z(m)</b> | <b>Latitude</b>  | <b>Longitude</b>   | <b>H(m)</b> |
|------------|--------------|--------------|-------------|------------------|--------------------|-------------|
| BET1       | -2965385.038 | -972576.620  | 5543892.894 | 60.7879155166667 | -161.8417249694440 | 52.1755     |
| BET2       | -2965385.807 | -972580.343  | 5543891.836 | 60.7878960694444 | -161.8416644194440 | 52.1745     |
| BET3       | -2965388.374 | -972577.474  | 5543890.967 | 60.7878801611111 | -161.8417291583330 | 52.1705     |
|            |              |              |             |                  |                    |             |
| BIL1       | -1416445.875 | -4223577.023 | 4550862.161 | 45.8037068777778 | -108.5397229777780 | 1112.2525   |
| BIL2       | -1416449.941 | -4223574.886 | 4550862.878 | 45.8037161027778 | -108.5397813000000 | 1112.2555   |
| BIL3       | -1416441.567 | -4223574.285 | 4550866.014 | 45.8037566138889 | -108.5396816416670 | 1112.2505   |
|            |              |              |             |                  |                    |             |
| BRW1       | -1886758.917 | -809058.660  | 6018494.476 | 71.2827649777778 | -156.7899247777780 | 15.5695     |
| BRW2       | -1886756.331 | -809055.918  | 6018495.653 | 71.2827977083333 | -156.7899666694440 | 15.5745     |
| BRW3       | -1886755.236 | -809059.698  | 6018495.459 | 71.2827930500000 | -156.7898576638890 | 15.5455     |
|            |              |              |             |                  |                    |             |
| CDB1       | -3484099.050 | -1084748.787 | 5213678.633 | 55.1923741638889 | -162.7064046027780 | 49.6995     |
| CDB2       | -3484105.690 | -1084741.587 | 5213675.688 | 55.1923280972222 | -162.7065435305560 | 49.6785     |
| CDB3       | -3484111.968 | -1084734.816 | 5213672.939 | 55.1922846333333 | -162.7066743472220 | 49.6945     |
|            |              |              |             |                  |                    |             |
| FAI1       | -2304741.811 | -1448715.278 | 5748843.683 | 64.8096300083333 | -147.8473409000000 | 149.9335    |
| FAI2       | -2304741.329 | -1448706.466 | 5748846.072 | 64.8096805000000 | -147.8474925250000 | 149.9255    |
| FAI3       | -2304732.799 | -1448707.403 | 5748849.218 | 64.8097470777778 | -147.8473802833330 | 149.9105    |
|            |              |              |             |                  |                    |             |
| HNL1       | -5508637.117 | -2234493.256 | 2303722.235 | 21.3129906416667 | -157.9208280611110 | 24.6805     |
| HNL2       | -5508656.282 | -2234483.577 | 2303686.987 | 21.3126477194444 | -157.9209839388890 | 25.0245     |
| HNL3       | -5508647.685 | -2234497.507 | 2303694.076 | 21.3127163277778 | -157.9208283694440 | 25.0575     |
|            |              |              |             |                  |                    |             |
| JNU1       | -2354254.895 | -2388549.650 | 5407043.118 | 58.3625746222222 | -134.5857070472220 | 16.1045     |
| JNU2       | -2354252.804 | -2388565.758 | 5407036.941 | 58.3624690638889 | -134.5854884305560 | 16.0935     |
| JNU3       | -2354239.585 | -2388568.608 | 5407041.403 | 58.3625454888889 | -134.5852934111110 | 16.0895     |
|            |              |              |             |                  |                    |             |
| MMD1       | 35070.416    | -5959686.670 | 2264365.772 | 20.9319092972222 | -89.6628407305556  | 29.1235     |
| MMD2       | 35065.494    | -5959687.030 | 2264364.986 | 20.9319015972222 | -89.6628880694444  | 29.1525     |
| MMD3       | 35065.157    | -5959685.238 | 2264369.640 | 20.9319466472222 | -89.6628912000000  | 29.1395     |
|            |              |              |             |                  |                    |             |
| MMX1       | -948701.057  | -5943935.311 | 2109212.618 | 19.4316536750000 | -99.0683897000000  | 2235.2855   |
| MMX2*      | -948696.628  | -5943935.142 | 2109215.039 | 19.4316768972222 | -99.0683483222222  | 2235.275    |
| MMX3       | -948705.488  | -5943935.493 | 2109210.193 | 19.4316303888889 | -99.0684310777778  | 2235.3065   |
|            |              |              |             |                  |                    |             |
| MPR1       | -1570142.212 | -5759530.592 | 2238184.761 | 20.6790034138889 | -105.2492031666670 | 10.9665     |
| MPR2       | -1570139.395 | -5759530.101 | 2238188.813 | 20.6790415250000 | -105.2491783194440 | 11.2615     |
| MPR3       | -1570143.505 | -5759527.989 | 2238190.581 | 20.6790595166667 | -105.2492217083330 | 10.9905     |
|            |              |              |             |                  |                    |             |
| MSD1       | -1979519.772 | -5523223.006 | 2493106.814 | 23.1604471888889 | -109.7176486805560 | 104.2695    |
| MSD2       | -1979521.336 | -5523225.336 | 2493100.409 | 23.1603843555556 | -109.7176553833330 | 104.2515    |
| MSD3       | -1979525.784 | -5523222.079 | 2493104.082 | 23.1604204083333 | -109.7177070055560 | 104.2575    |
|            |              |              |             |                  |                    |             |
| MTP1       | -254854.356  | -6162909.170 | 1617805.074 | 14.7913660638889 | -92.3679992027778  | 54.9485     |
| MTP2       | -254850.736  | -6162910.200 | 1617801.641 | 14.7913340305556 | -92.3679652111111  | 54.9215     |
| MTP3       | -254855.509  | -6162910.303 | 1617800.114 | 14.7913200000000 | -92.3680094694444  | 54.8225     |
|            |              |              |             |                  |                    |             |
| OTZ1       | -2396056.018 | -750356.160  | 5843502.514 | 66.8873321833333 | -162.6113729250000 | 10.8835     |
| OTZ2       | -2396052.845 | -750354.329  | 5843504.036 | 66.8873670305556 | -162.6113911527780 | 10.8795     |
| OTZ3       | -2396052.828 | -750358.270  | 5843503.547 | 66.8873557222222 | -162.6113052222220 | 10.8855     |
|            |              |              |             |                  |                    |             |
| YFB1       | 1035381.437  | -2634289.653 | 5696539.534 | 63.7314904361111 | -68.5431837138889  | 10.0255     |
| YFB2       | 1035372.228  | -2634296.056 | 5696538.180 | 63.7314642166667 | -68.5434046222222  | 9.9575      |
| YFB3       | 1035366.158  | -2634306.812 | 5696534.407 | 63.7313865722222 | -68.5435986222222  | 10.0215     |
|            |              |              |             |                  |                    |             |
| YQX1       | 2430424.626  | -3419640.391 | 4788223.836 | 48.9664900638889 | -54.5976322388889  | 146.8775    |
| YQX2       | 2430432.587  | -3419639.050 | 4788220.783 | 48.9664481805556 | -54.5975330083333  | 146.8845    |

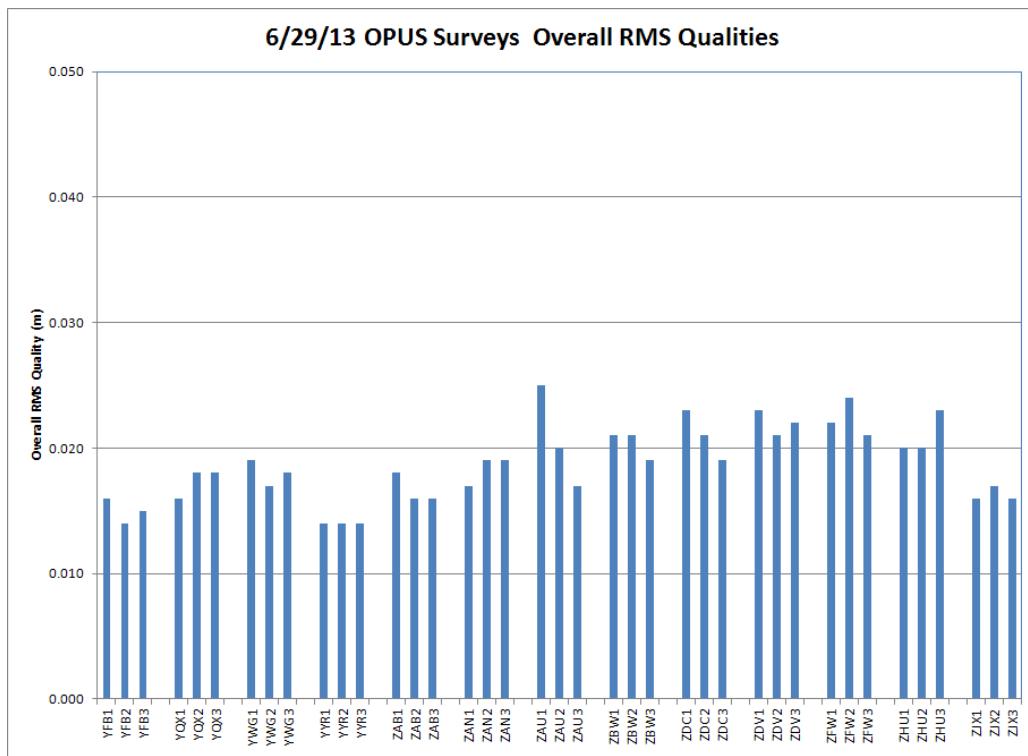
| <b>WRE</b> | <b>X(m)</b>  | <b>Y(m)</b>  | <b>Z(m)</b> | <b>Latitude</b>  | <b>Longitude</b>   | <b>H(m)</b> |
|------------|--------------|--------------|-------------|------------------|--------------------|-------------|
| YQX3       | 2430440.488  | -3419637.676 | 4788217.763 | 48.9664069027778 | -54.5974341861111  | 146.8765    |
|            |              |              |             |                  |                    |             |
| YWG1       | -520164.365  | -4083475.937 | 4855843.060 | 49.9005744888889 | -97.2593974777778  | 222.1135    |
| YWG2       | -520150.486  | -4083468.875 | 4855850.454 | 49.9006775416667 | -97.2592182694444  | 222.1275    |
| YWG3       | -520152.360  | -4083477.994 | 4855842.628 | 49.9005683861111 | -97.2592281055556  | 222.1195    |
|            |              |              |             |                  |                    |             |
| YYR1       | 1885341.417  | -3321428.358 | 5091171.661 | 53.3086471750000 | -60.4194683750000  | 37.8475     |
| YYR2       | 1885344.378  | -3321419.876 | 5091176.074 | 53.3087134833333 | -60.4193669277778  | 37.8525     |
| YYR3       | 1885340.091  | -3321413.059 | 5091182.074 | 53.3088036527778 | -60.4193723750000  | 37.8565     |
|            |              |              |             |                  |                    |             |
| ZAB1       | -1488636.840 | -5003946.540 | 3654557.711 | 35.1735754166667 | -106.5673497416670 | 1620.1265   |
| ZAB2       | -1488631.505 | -5003948.220 | 3654557.685 | 35.1735747666667 | -106.5672883666670 | 1620.1845   |
| ZAB3       | -1488632.286 | -5003950.803 | 3654553.831 | 35.1735323666667 | -106.5672885055560 | 1620.1705   |
|            |              |              |             |                  |                    |             |
| ZAN1       | -2659536.641 | -1549114.779 | 5567750.748 | 61.2292017611111 | -149.7802507111110 | 80.6865     |
| ZAN2       | -2659548.398 | -1549110.827 | 5567746.254 | 61.2291180833333 | -149.7804244416670 | 80.6795     |
| ZAN3       | -2659541.352 | -1549106.702 | 5567750.737 | 61.2292016722222 | -149.7804247777780 | 80.6795     |
|            |              |              |             |                  |                    |             |
| ZAU1       | 138704.120   | -4761244.141 | 4227763.936 | 41.7826580833333 | -88.3313366416667  | 195.8905    |
| ZAU2       | 138704.375   | -4761248.749 | 4227758.767 | 41.7825957055556 | -88.3313351916667  | 195.8865    |
| ZAU3       | 138711.083   | -4761248.488 | 4227758.850 | 41.7825966583333 | -88.3312544444444  | 195.8935    |
|            |              |              |             |                  |                    |             |
| ZBW1       | 1490299.222  | -4448983.174 | 4306010.502 | 42.7357205194444 | -71.4804258583333  | 39.1215     |
| ZBW2       | 1490304.335  | -4448981.158 | 4306010.842 | 42.7357245277778 | -71.4803588305556  | 39.1405     |
| ZBW3       | 1490306.046  | -4448984.793 | 4306006.543 | 42.7356717222222 | -71.4803531194444  | 39.1535     |
|            |              |              |             |                  |                    |             |
| ZDC1       | 1069125.773  | -4839598.994 | 4001126.515 | 39.1015959055556 | -77.5427464305556  | 80.0755     |
| ZDC2       | 1069128.159  | -4839603.627 | 4001120.310 | 39.1015239055556 | -77.5427310500000  | 80.0725     |
| ZDC3       | 1069124.047  | -4839602.705 | 4001122.499 | 39.1015493555556 | -77.5427751777778  | 80.0655     |
|            |              |              |             |                  |                    |             |
| ZDV1       | -1273628.607 | -4711375.572 | 4094890.118 | 40.1873033416667 | -105.1272243027780 | 1541.3575   |
| ZDV2       | -1273622.901 | -4711377.088 | 4094890.125 | 40.1873035361111 | -105.1271549916670 | 1541.3425   |
| ZDV3       | -1273624.915 | -4711380.278 | 4094885.838 | 40.1872531055556 | -105.1271680444440 | 1541.3295   |
|            |              |              |             |                  |                    |             |
| ZFW1       | -659983.194  | -5324060.790 | 3438276.481 | 32.8306497361111 | -97.0664717194444  | 155.6345    |
| ZFW2       | -659988.458  | -5324063.338 | 3438271.481 | 32.8305963250000 | -97.0665241638889  | 155.5925    |
| ZFW3       | -659983.491  | -5324063.864 | 3438271.686 | 32.8305983194444 | -97.0664708305556  | 155.6285    |
|            |              |              |             |                  |                    |             |
| ZHU1       | -513864.465  | -5506451.718 | 3166720.481 | 29.9618963638889 | -95.3314261944444  | 10.8635     |
| ZHU2       | -513867.118  | -5506455.100 | 3166714.315 | 29.9618318888889 | -95.3314503027778  | 10.9155     |
| ZHU3       | -513873.391  | -5506457.754 | 3166708.720 | 29.9617736305556 | -95.3315124555556  | 10.9155     |
|            |              |              |             |                  |                    |             |
| ZJX1       | 772646.448   | -5434462.196 | 3237231.750 | 30.6988596750000 | -81.9081850805556  | 2.1465      |
| ZJX2       | 772649.773   | -5434463.744 | 3237228.345 | 30.6988240527778 | -81.9081529944445  | 2.1285      |
| ZJX3       | 772645.715   | -5434466.177 | 3237225.239 | 30.6987915055556 | -81.9081985027778  | 2.1225      |
|            |              |              |             |                  |                    |             |
| ZKC1       | -415247.514  | -4954556.380 | 3982161.114 | 38.8801594500000 | -94.7908338083333  | 305.8895    |
| ZKC2       | -415231.116  | -4954557.710 | 3982161.175 | 38.8801601277778 | -94.7906442194444  | 305.8935    |
| ZKC3       | -415237.242  | -4954561.063 | 3982155.985 | 38.8801019500000 | -94.7907113416667  | 305.6345    |
|            |              |              |             |                  |                    |             |
| ZLA1       | -2474409.931 | -4637294.634 | 3602183.522 | 34.6035182944444 | -118.0838954027780 | 763.4925    |
| ZLA2       | -2474404.660 | -4637297.447 | 3602183.538 | 34.6035184083333 | -118.0838302805560 | 763.5015    |
| ZLA3       | -2474411.264 | -4637297.126 | 3602179.556 | 34.6034744055556 | -118.0838954361110 | 763.5665    |
|            |              |              |             |                  |                    |             |
| ZLC1       | -1808273.208 | -4486410.824 | 4145303.029 | 40.7860433666667 | -111.9521774805560 | 1287.4385   |
| ZLC2       | -1808274.611 | -4486414.424 | 4145298.529 | 40.7859899694444 | -111.9521769527780 | 1287.4235   |
| ZLC3       | -1808270.399 | -4486416.131 | 4145298.515 | 40.7859898222222 | -111.9521231194440 | 1287.4215   |
|            |              |              |             |                  |                    |             |

| <b>WRE</b> | <b>X(m)</b>  | <b>Y(m)</b>  | <b>Z(m)</b> | <b>Latitude</b>  | <b>Longitude</b>   | <b>H(m)</b> |
|------------|--------------|--------------|-------------|------------------|--------------------|-------------|
| ZMA1       | 966042.299   | -5662999.819 | 2761581.503 | 25.8246122388889 | -80.3191898000000  | -7.5895     |
| ZMA2       | 966029.326   | -5662999.123 | 2761585.988 | 25.8246599583333 | -80.3193161722222  | -8.2175     |
| ZMA3       | 966037.405   | -5662997.960 | 2761586.346 | 25.8246620333333 | -80.3192347944444  | -7.8705     |
|            |              |              |             |                  |                    |             |
| ZME1       | 4070.897     | -5226189.294 | 3644028.423 | 35.0673941305556 | -89.9553699305556  | 68.6005     |
| ZME2       | 4070.927     | -5226186.748 | 3644032.543 | 35.0674377055556 | -89.9553695805556  | 68.8835     |
| ZME3       | 4064.733     | -5226186.628 | 3644032.701 | 35.0674395222222 | -89.9554374861111  | 68.8725     |
|            |              |              |             |                  |                    |             |
| ZMP1       | -249978.380  | -4539297.503 | 4458955.057 | 44.6374632750000 | -93.1520854666667  | 262.6605    |
| ZMP2       | -249972.577  | -4539297.846 | 4458955.064 | 44.6374631777778 | -93.1520122055556  | 262.6815    |
| ZMP3       | -249973.674  | -4539302.123 | 4458950.584 | 44.6374071111111 | -93.1520230472222  | 262.6155    |
|            |              |              |             |                  |                    |             |
| ZNY1       | 1406144.635  | -4627343.988 | 4144322.057 | 40.7843285611111 | -73.0971657027778  | 6.4525      |
| ZNY2       | 1406146.429  | -4627347.021 | 4144317.276 | 40.7842758194444 | -73.0971558138889  | 5.9215      |
| ZNY3       | 1406140.880  | -4627348.677 | 4144317.321 | 40.7842763027778 | -73.0972244194444  | 5.9295      |
|            |              |              |             |                  |                    |             |
| ZOA1       | -2684436.868 | -4293337.412 | 3865351.868 | 37.5430538944444 | -122.0159477111110 | -3.4955     |
| ZOA2       | -2684433.845 | -4293341.475 | 3865349.422 | 37.5430263055556 | -122.0158943333330 | -3.5255     |
| ZOA3       | -2684438.227 | -4293342.353 | 3865345.568 | 37.5429819305556 | -122.0159311111110 | -3.4415     |
|            |              |              |             |                  |                    |             |
| ZOB1       | 650770.181   | -4754715.671 | 4187420.751 | 41.2971544611111 | -82.2064447583333  | 223.6805    |
| ZOB2       | 650777.870   | -4754714.855 | 4187422.777 | 41.2971667805556 | -82.2063524861111  | 225.1935    |
| ZOB3       | 650776.193   | -4754719.668 | 4187414.978 | 41.2970870388889 | -82.2063801166667  | 223.4585    |
|            |              |              |             |                  |                    |             |
| ZSE1       | -2308930.263 | -3668169.674 | 4663526.481 | 47.2869933222222 | -122.1883727638890 | 82.0985     |
| ZSE2       | -2308934.654 | -3668175.216 | 4663520.067 | 47.2869077361111 | -122.1883828527780 | 82.1535     |
| ZSE3       | -2308935.711 | -3668179.488 | 4663516.119 | 47.2868560305556 | -122.1883646055560 | 82.0875     |
|            |              |              |             |                  |                    |             |
| ZSU1       | 2462589.434  | -5529372.122 | 2003724.458 | 18.4313356333333 | -65.9934768055556  | -28.1035    |
| ZSU2       | 2462587.499  | -5529377.485 | 2003712.177 | 18.4312186250000 | -65.9935141916667  | -28.0855    |
| ZSU3       | 2462594.134  | -5529375.229 | 2003710.099 | 18.4311989861111 | -65.9934481361111  | -28.1375    |
|            |              |              |             |                  |                    |             |
| ZTL1       | 529840.423   | -5305248.813 | 3489342.848 | 33.3796885527778 | -84.2967258000000  | 261.1375    |
| ZTL2       | 529846.789   | -5305247.955 | 3489343.131 | 33.3796917805556 | -84.2966568111111  | 261.1085    |
| ZTL3       | 529847.473   | -5305251.398 | 3489337.899 | 33.3796350611111 | -84.2966531750000  | 261.1485    |

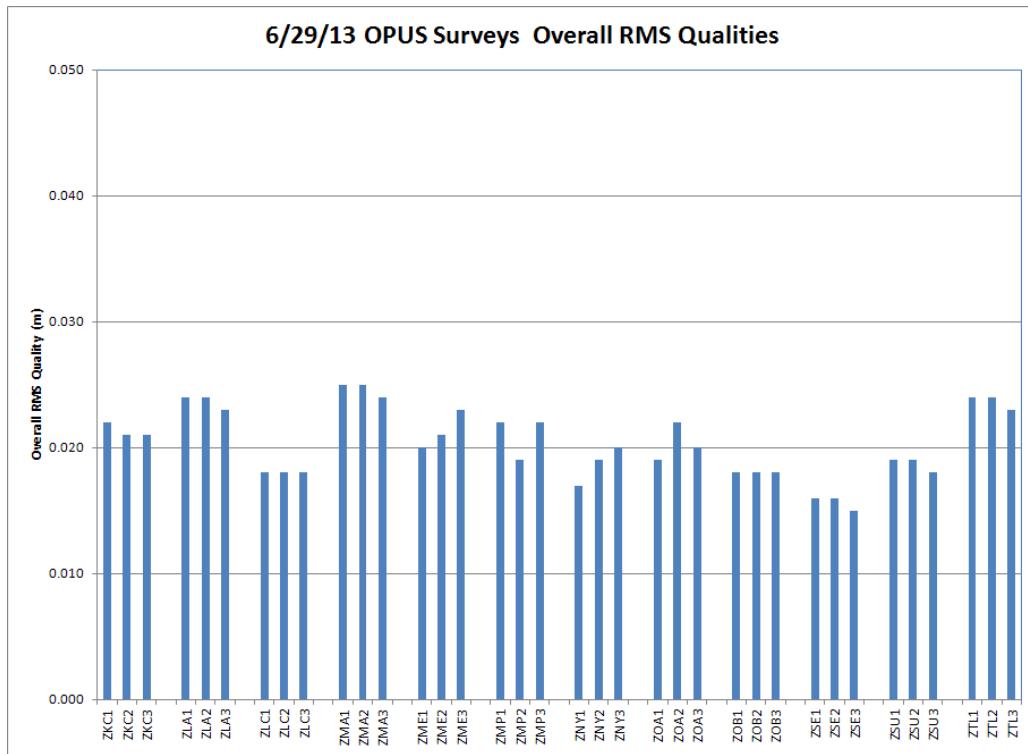
**Figure 10-1 WAAS Releases 3B1 & 4 Antenna Positions Deltas from 6/29/13 OPUS Survey****Figure 10-2 WAAS Releases 3B1 & 4 Antenna Positions Deltas from 6/29/13 OPUS Survey**

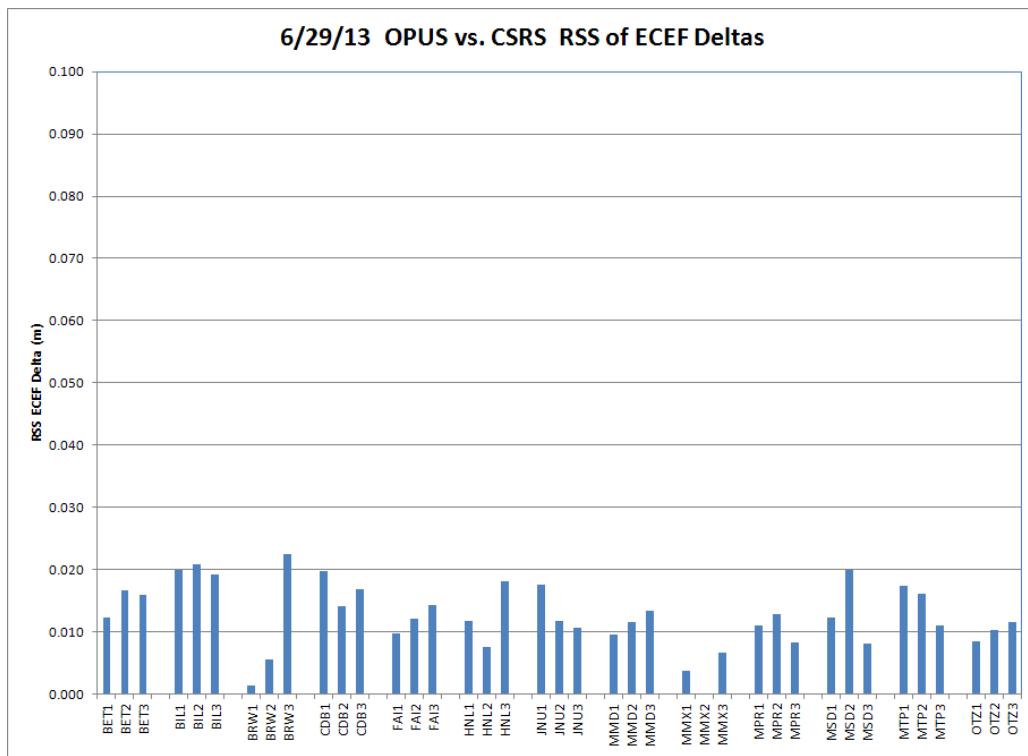
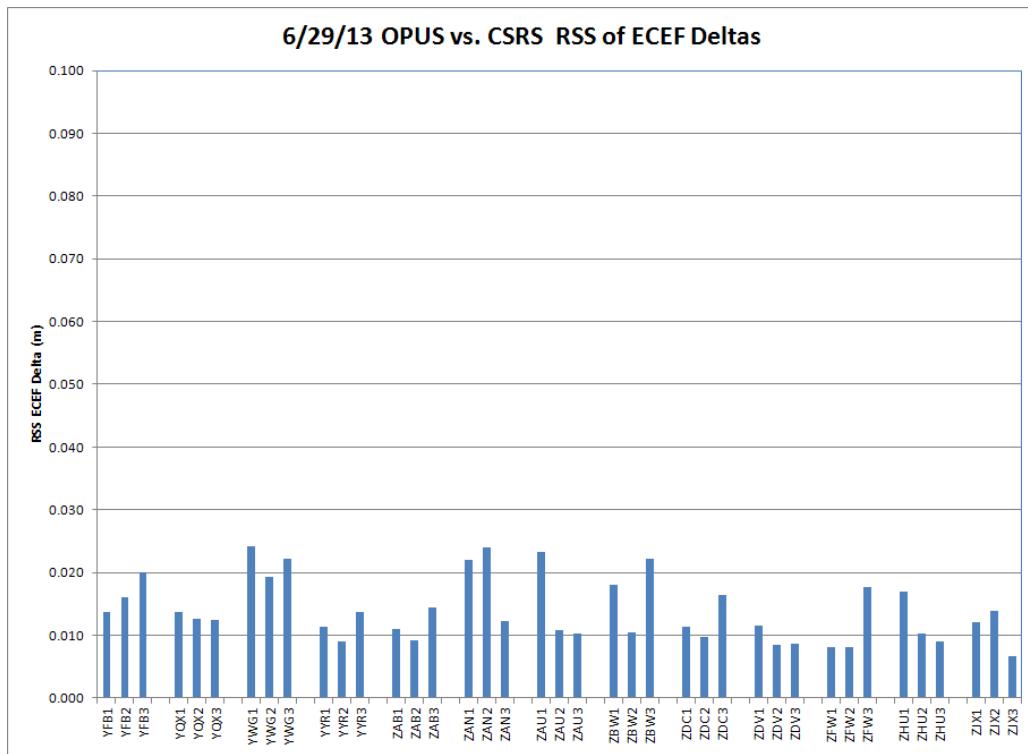
**Figure 10-3 WAAS Releases 3B1 & 4 Antenna Positions Deltas from 6/29/13 OPUS Survey****Figure 10-4 6/29/13 OPUS Survey Overall RMS Qualities**

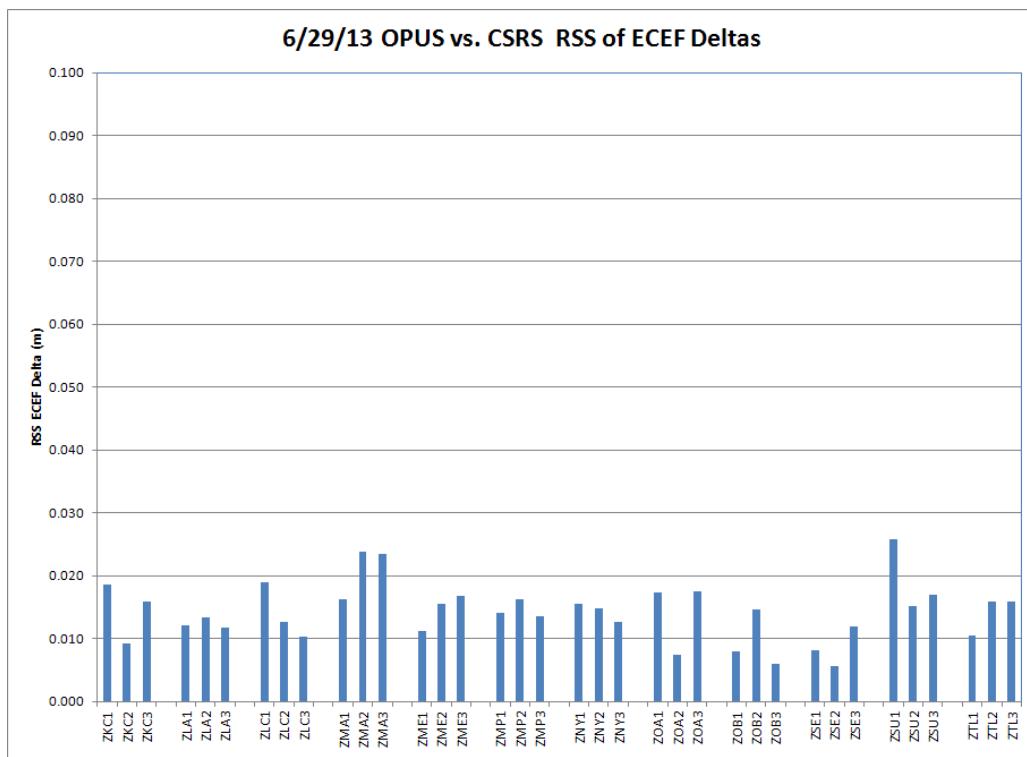
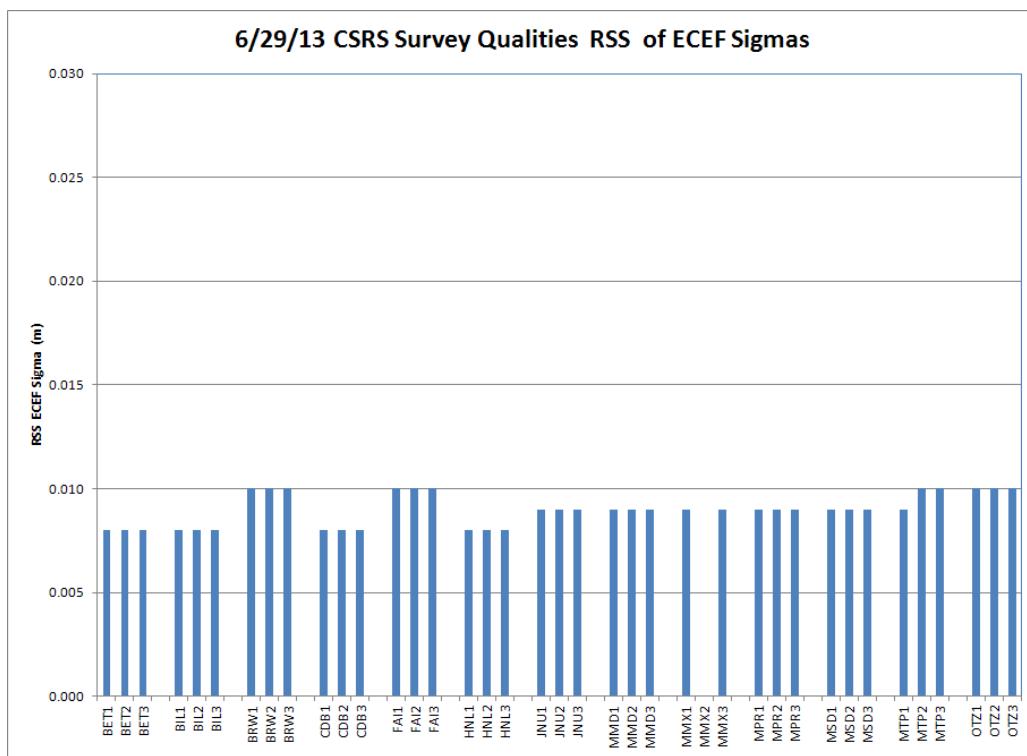
## Figure 10-5 6/29/13 OPUS Survey Overall RMS Qualities

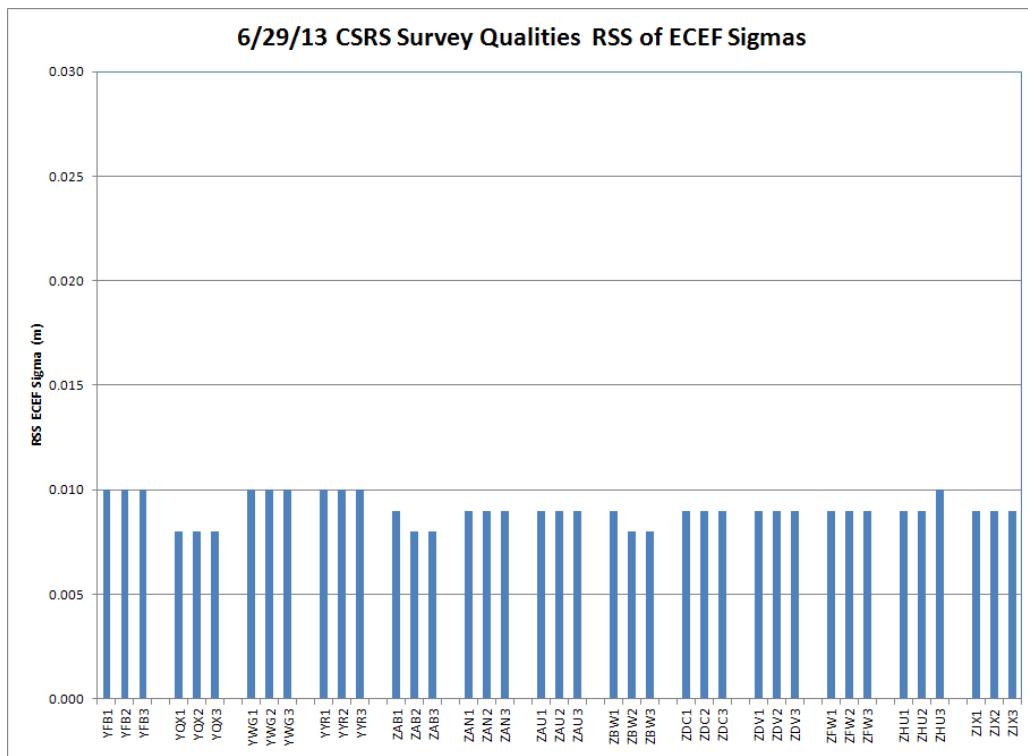
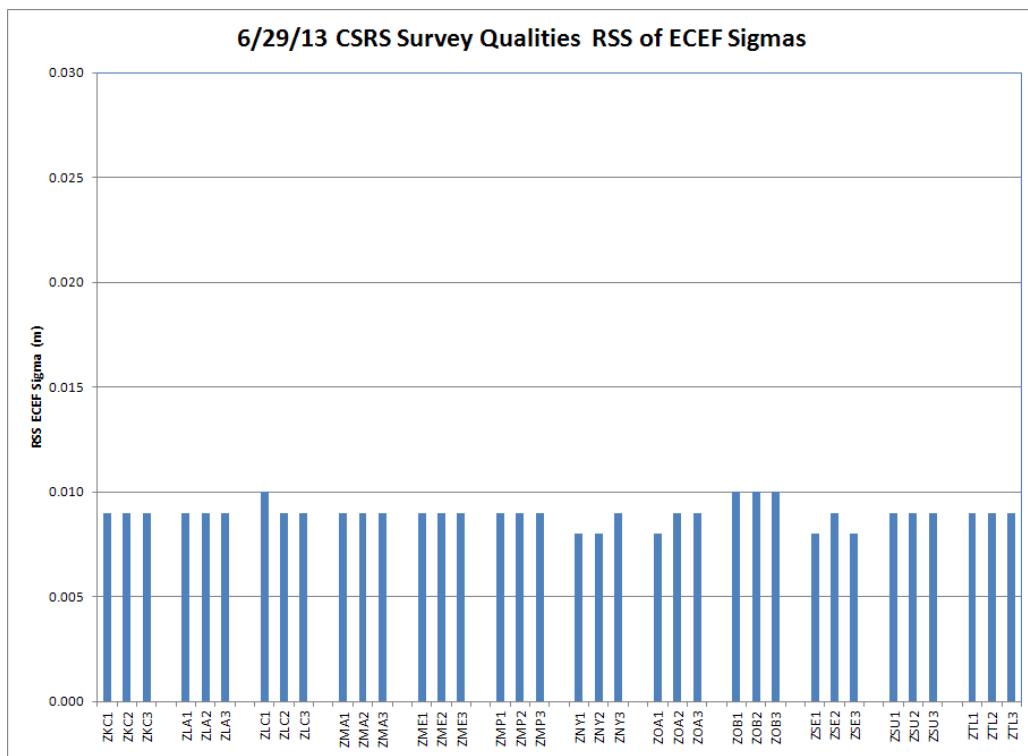


## **Figure 10-6 6/29/13 OPUS Survey Overall RMS Qualities**



**Figure 10-7 6/29/13 OPUS vs. CSRS RSS ECEF Deltas****Figure 10-8 6/29/13 OPUS vs. CSRS RSS ECEF Deltas**

**Figure 10-9 6/29/13 OPUS vs. CSRS RSS ECEF Deltas****Figure 10-10 6/29/13 CSRS Survey Qualities**

**Figure 10-11 6/29/13 CSRS Survey Qualities****Figure 10-12 6/29/13 CSRS Survey Qualities**

## **11.0 SIGNAL QUALITY MONITOR (SQM)**

The Signal Quality Monitor (SQM) is designed to detect signal deformations that originate in the GPS or GEO satellites and ensures that the UDRE values are sufficiently inflated to protect given the monitor's current observations. SQM processes various correlator spacing measurements produced by the reference station receivers to form four detection metrics for each receiver and calculates statistics based on the observed performance against "ideal" signal correlation peaks. This results in an estimate of the overall deformation per satellite. The deformation level calculated is then compared against threshold values, which includes the acceptable error levels per UDRE value. If the estimated deformation exceeds threshold, the monitor trips for the given satellite and the UDRE value is set to 'Don't Use'. The monitor depends on the entire ground network in order to ensure that the satellite is the source of any problem detected rather than a localized affect. Currently all 114 receivers are being used in the SQM computations.

WAAS SQM offline monitoring effort includes the monitoring of the PRN type biases, trips, and the estimated deformation for each satellite that will be referred to as PRN bias in this report.

### **11.1 Alpha Metrics**

The alpha metrics values are pre-determined by offline integrity analysis and are defined as constants in the SQM algorithm. These values remained unchanged for this reporting period and are listed in Table 11-1. Currently there are 4 sets of alpha metrics in the WAAS SQM algorithm that form four detection metrics for each receiver channel. For this report, the four detection metrics will be referred to as: DM1, DM2, DM3, and DM4.

**Table 11-1 Alpha Metrics**

| <b>Correlator Spacing</b> | <b>DM1</b> | <b>DM2</b>   | <b>DM3</b>    | <b>DM4</b>    |
|---------------------------|------------|--------------|---------------|---------------|
| -0.1                      | 0          | 0.43407318   | 0             | -0.36110353   |
| -0.075                    | 0          | 0.48570652   | -0.0058771682 | -0.74860302   |
| -0.05                     | -0.4071265 | -0.69931105  | -0.011382325  | 0.23726003    |
| -0.025                    | 1          | -0.010099034 | 0.00037033029 | -0.0076011735 |
| 0                         | 0          | 0            | 0             | 0             |
| 0.025                     | -0.25      | 0.13317879   | 0.99991788    | -0.062414070  |
| 0.05                      | 1.008525   | -0.22851782  | 0             | 0.25177272    |
| 0.075                     | 0          | 0.10209042   | 0             | 0.42875623    |
| 0.1                       | 0          | 0.078436452  | 0             | 0.41602138    |

### **11.2 Type Bias**

PRN Type biases are evaluated as part of the WAAS SQM offline monitoring effort. Depending on the PRN number of any given satellite, it can be classified into three categories of correlation function shapes: skinny (Type 0), nominal (Type 1), and broad (Type 2). Wideband geostationary satellites are considered a different type (Type 3). PRN-type estimates are computed at each epoch and daily averages are computed for each type, for four detection metrics.

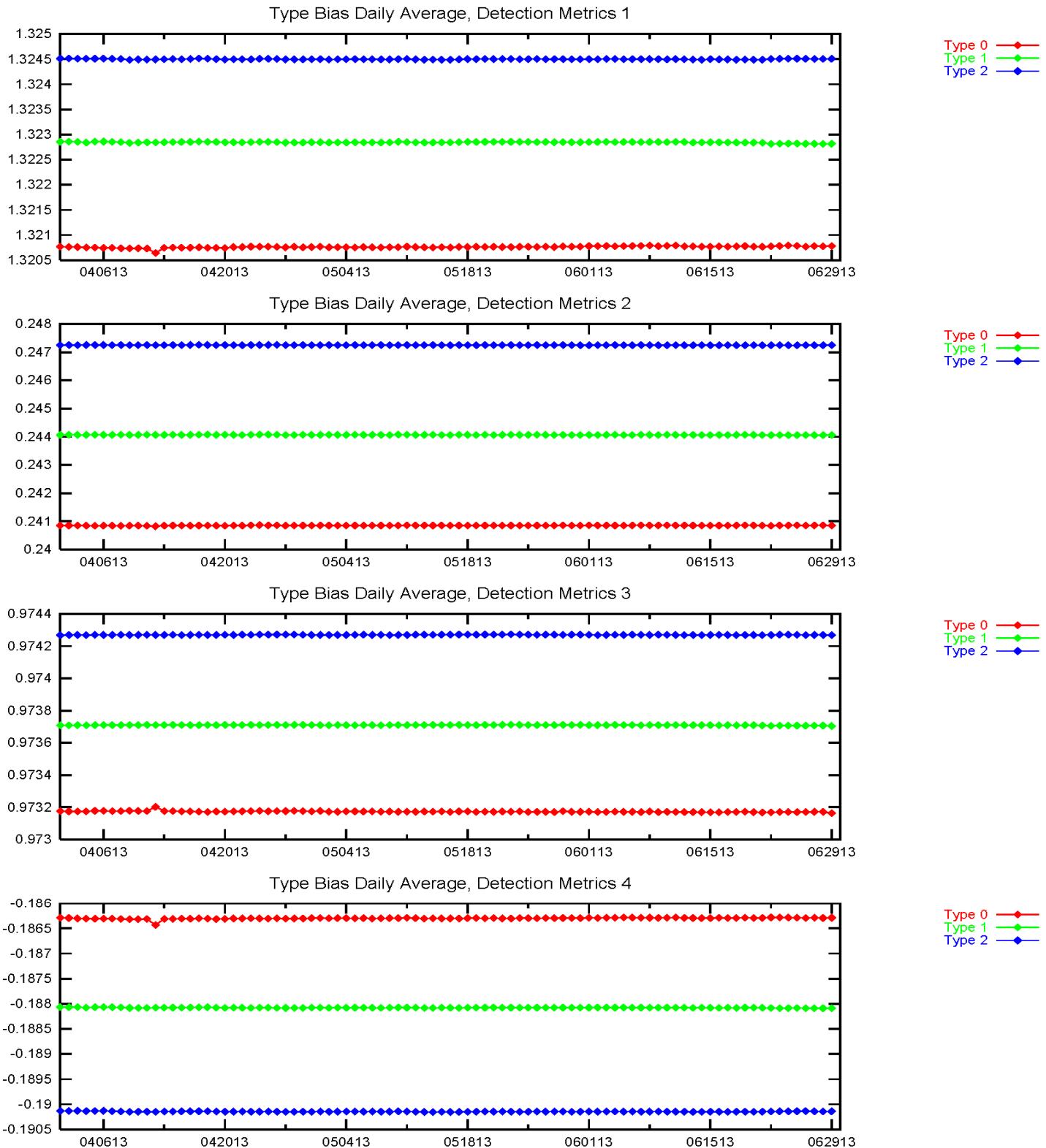
For this reporting period, geostationary satellites type biases are not evaluated. Table 11-3 shows the rollup average for the quarter. Table 11-4 shows the rollup average since January 1, 2008. Figure 11-1 shows the daily average for the four detection metrics for the quarter.

**Table 11-2 Type Bias Average for the Quarter**

| <b>Detection Metric</b> | <b>Type 0</b> | <b>Type 1</b> | <b>Type 2</b> |
|-------------------------|---------------|---------------|---------------|
| DM 1                    | 1.3207600     | 1.3228400     | 1.3245000     |
| DM 2                    | 0.2408520     | 0.2440660     | 0.2472500     |
| DM 3                    | 0.9731730     | 0.9737100     | 0.9742700     |
| DM 4                    | -0.1863000    | -0.1880780    | -0.1901430    |

**Table 11-3 Type Bias Average Since January 1, 2008**

| <b>Detection Metric</b> | <b>Type 0</b> | <b>Type 1</b> | <b>Type 2</b> |
|-------------------------|---------------|---------------|---------------|
| DM 1                    | 1.3209200     | 1.3228800     | 1.3245900     |
| DM 2                    | 0.2408470     | 0.2440950     | 0.2472760     |
| DM 3                    | 0.9731740     | 0.9737090     | 0.9742760     |
| DM 4                    | -0.1862080    | -0.1880650    | -0.1901000    |

**Figure 11-1 Type Bias Average Trend**

### 11.3 PRN Bias

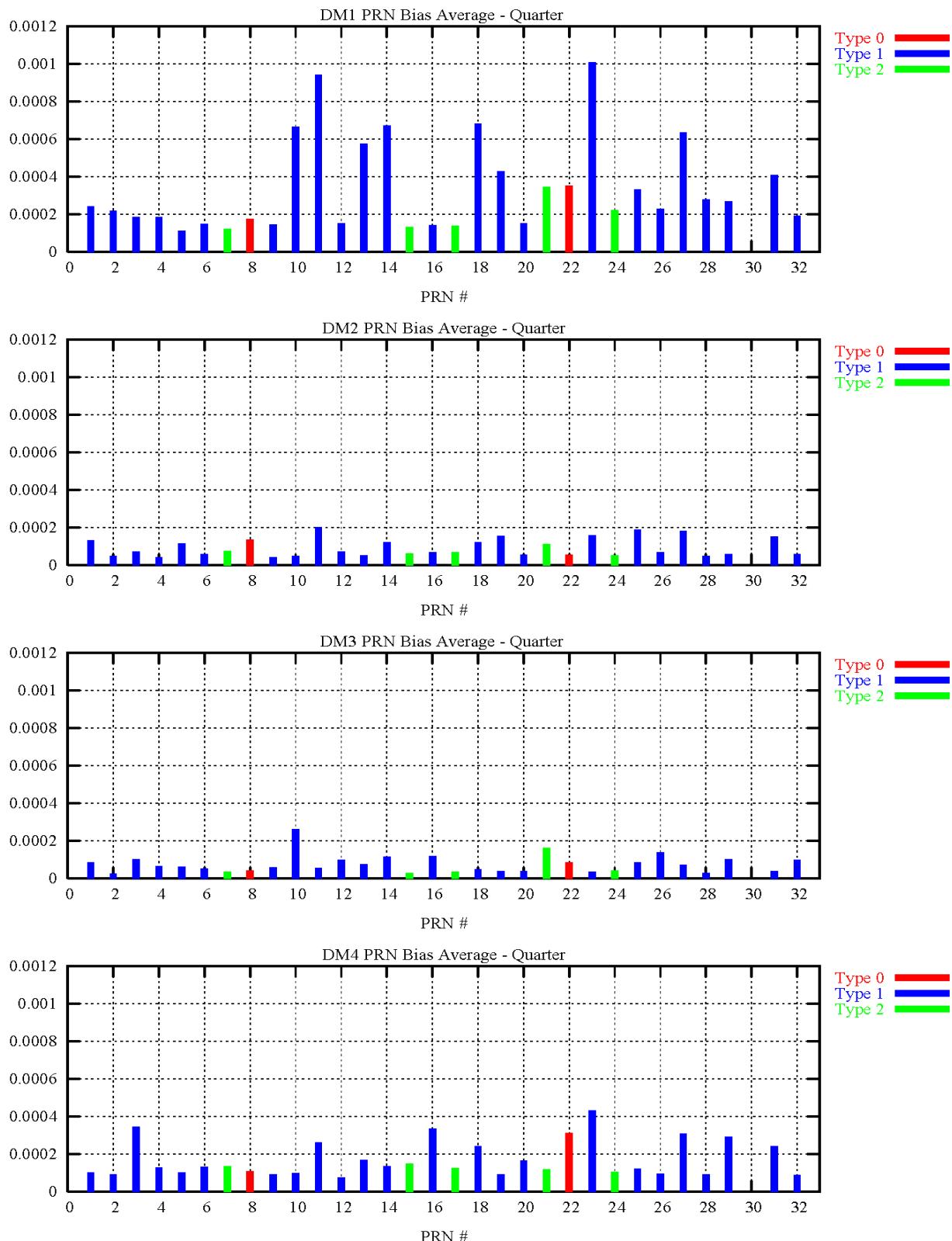
PRN biases are evaluated as part of the WAAS SQM offline monitoring effort. PRN bias is the overall estimated deformation per satellite across receivers. Detection metrics are adjusted for inter-receiver bias, corrected for PRN type bias, and combined across receivers for each satellite. Relying on the assertion that the majority of the SV signals are healthy and normal, detection metrics are normalized over all the satellites on orbit resulting in an overall PRN bias for each satellite. PRN biases are collected at each epoch and daily averages are computed for each satellite, for four detection metrics.

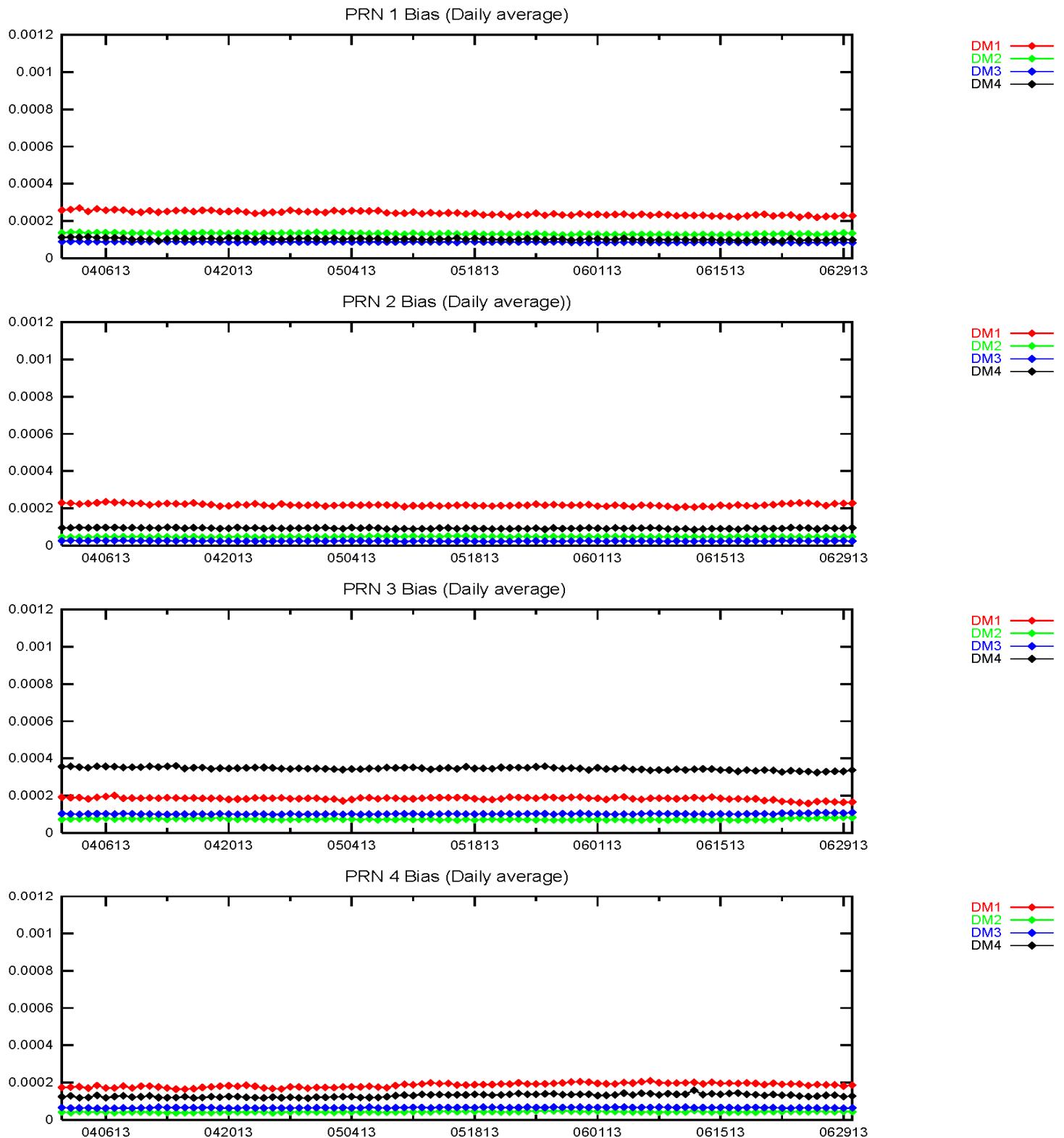
Table 11-4 and Figure 11-2 show the rollup PRN bias average for the quarter. Figures 11-3 to 11-10 show the PRN bias average trend for each SV. The maximum average for DM1 for this quarter is PRN 23 at 0.0010331. The maximum average for DM2 is PRN 25 at 0.0002325. The maximum average for DM3 is PRN 10 at 0.0002736 and the maximum average for DM4 is PRN 23 at 0.0004486.

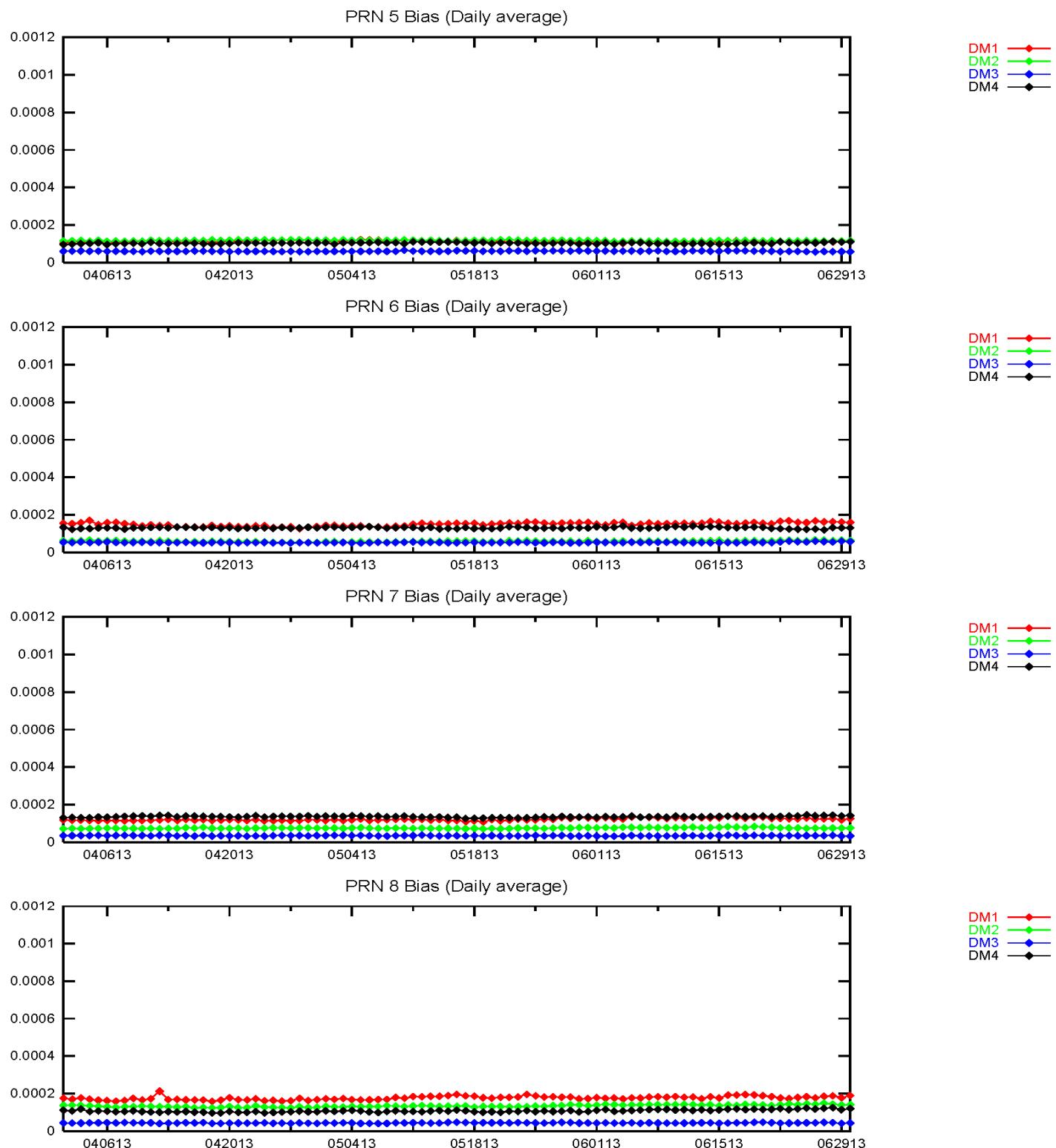
For this reporting period, geostationary satellite biases are not evaluated. Please refer to Table 1-5 for events that may have an impact on PRN bias statistics. The small spikes in PRN bias daily average are due to satellite outages. On the days of satellite maintenance, partial data resulted in a slightly varied PRN bias daily average compared to full day data average. A new satellite, SVN-66, was launched on 6/21/13 and has been online as PRN 27.

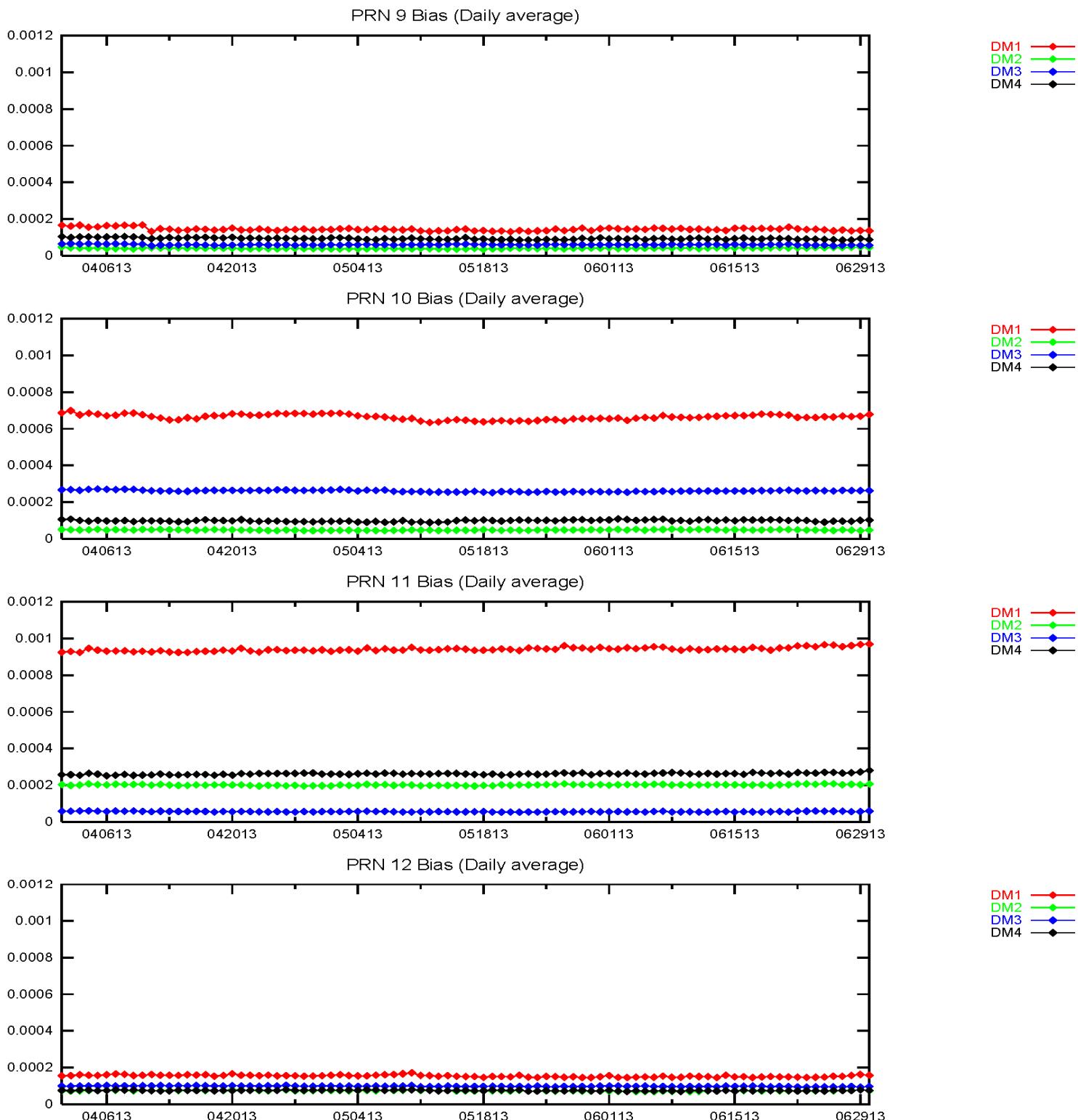
**Table 11-4 PRN Bias Average for the Quarter**

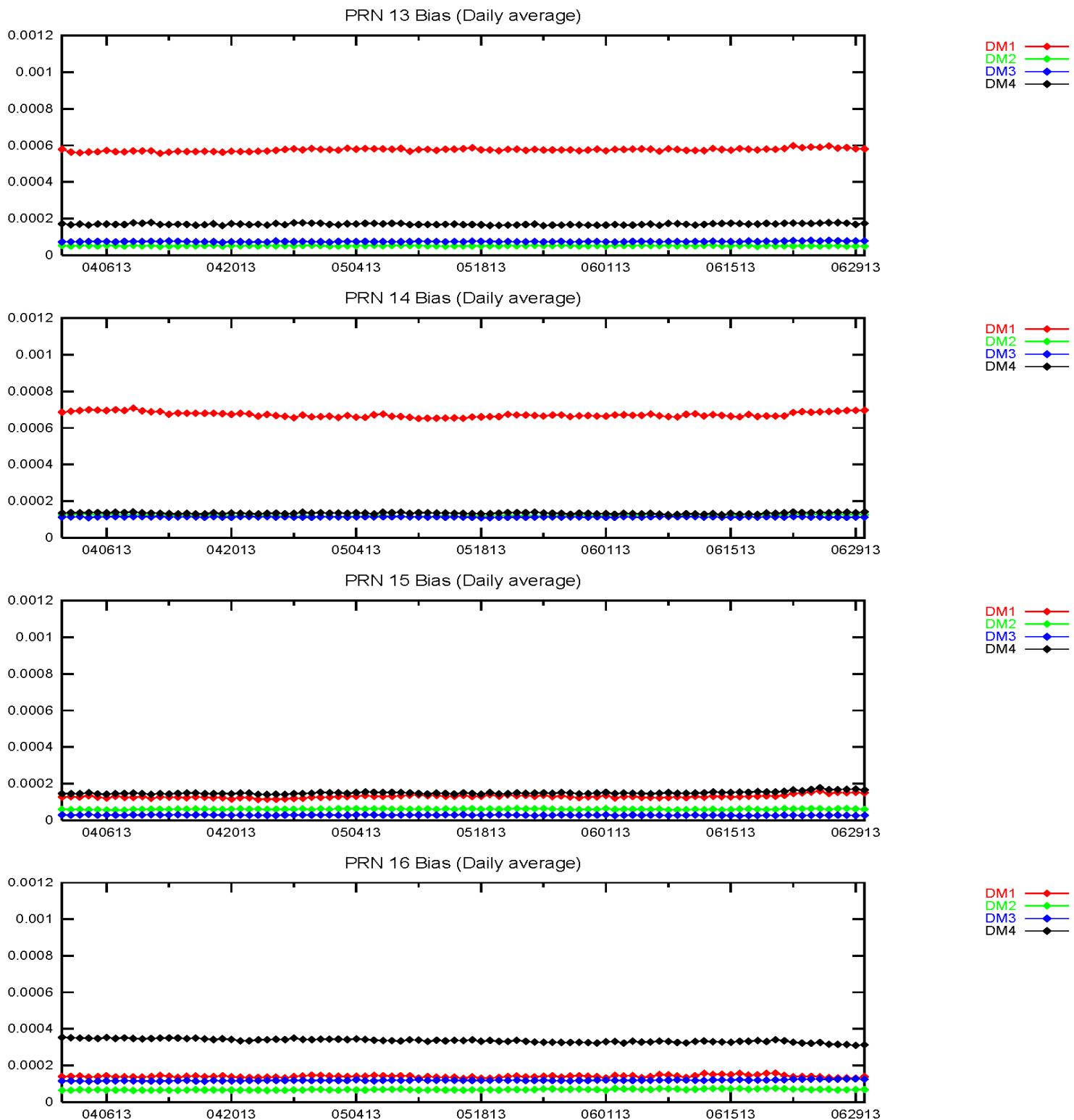
| <b>PRN</b> | <b>SVN</b> | <b>DM1</b> | <b>DM2</b> | <b>DM3</b> | <b>DM4</b> |
|------------|------------|------------|------------|------------|------------|
| 1          | 63         | 0.0002414  | 0.0001318  | 0.0000867  | 0.0001027  |
| 2          | 61         | 0.0002183  | 0.0000476  | 0.0000245  | 0.0000930  |
| 3          | 33         | 0.0001842  | 0.0000735  | 0.0001022  | 0.0003452  |
| 4          | 34         | 0.0001861  | 0.0000426  | 0.0000655  | 0.0001299  |
| 5          | 50         | 0.0001123  | 0.0001171  | 0.0000607  | 0.0001037  |
| 6          | 36         | 0.0001501  | 0.0000593  | 0.0000530  | 0.0001311  |
| 7          | 34         | 0.0001219  | 0.0000757  | 0.0000347  | 0.0001363  |
| 8          | 38         | 0.0001767  | 0.0001345  | 0.0000438  | 0.0001081  |
| 9          | 39         | 0.0001446  | 0.0000404  | 0.0000601  | 0.0000937  |
| 10         | 40         | 0.0006642  | 0.0000480  | 0.0002612  | 0.0000986  |
| 11         | 46         | 0.0009408  | 0.0002016  | 0.0000559  | 0.0002623  |
| 12         | 58         | 0.0001541  | 0.0000734  | 0.0000983  | 0.0000751  |
| 13         | 43         | 0.0005756  | 0.0000517  | 0.0000750  | 0.0001697  |
| 14         | 41         | 0.0006726  | 0.0001224  | 0.0001136  | 0.0001343  |
| 15         | 55         | 0.0001306  | 0.0000607  | 0.0000283  | 0.0001503  |
| 16         | 56         | 0.0001408  | 0.0000683  | 0.0001189  | 0.0003357  |
| 17         | 53         | 0.0001394  | 0.0000706  | 0.0000341  | 0.0001259  |
| 18         | 54         | 0.0006815  | 0.0001221  | 0.0000486  | 0.0002423  |
| 19         | 59         | 0.0004299  | 0.0001545  | 0.0000393  | 0.0000910  |
| 20         | 51         | 0.0001521  | 0.0000564  | 0.0000388  | 0.0001666  |
| 21         | 45         | 0.0003466  | 0.0001109  | 0.0001615  | 0.0001171  |
| 22         | 47         | 0.0003538  | 0.0000547  | 0.0000866  | 0.0003108  |
| 23         | 60         | 0.0010089  | 0.0001606  | 0.0000353  | 0.0004325  |
| 24         | 65         | 0.0002229  | 0.0000532  | 0.0000410  | 0.0001054  |
| 25         | 62         | 0.0003303  | 0.0001893  | 0.0000844  | 0.0001221  |
| 26         | 26         | 0.0002291  | 0.0000683  | 0.0001390  | 0.0000954  |
| 27         | 66         | 0.0006349  | 0.0001817  | 0.0000725  | 0.0003083  |
| 28         | 44         | 0.0002800  | 0.0000475  | 0.0000299  | 0.0000921  |
| 29         | 57         | 0.0002676  | 0.0000580  | 0.0001011  | 0.0002935  |
| 30         | 30         |            |            |            |            |
| 31         | 52         | 0.0004095  | 0.0001509  | 0.0000392  | 0.0002426  |
| 32         | 23         | 0.0001936  | 0.0000576  | 0.0001001  | 0.0000899  |

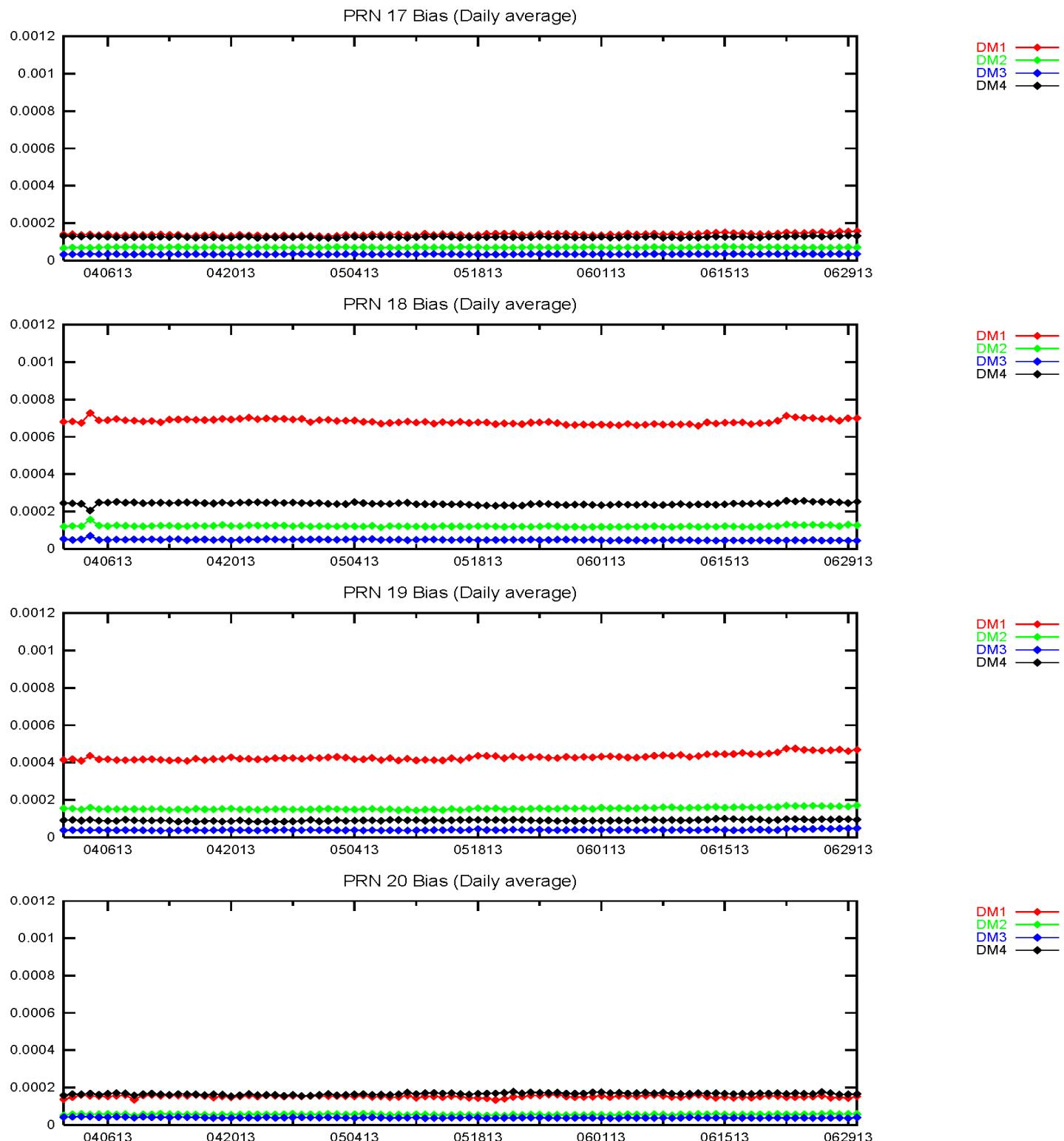
**Figure 11-2 PRN Bias Average for the Quarter**

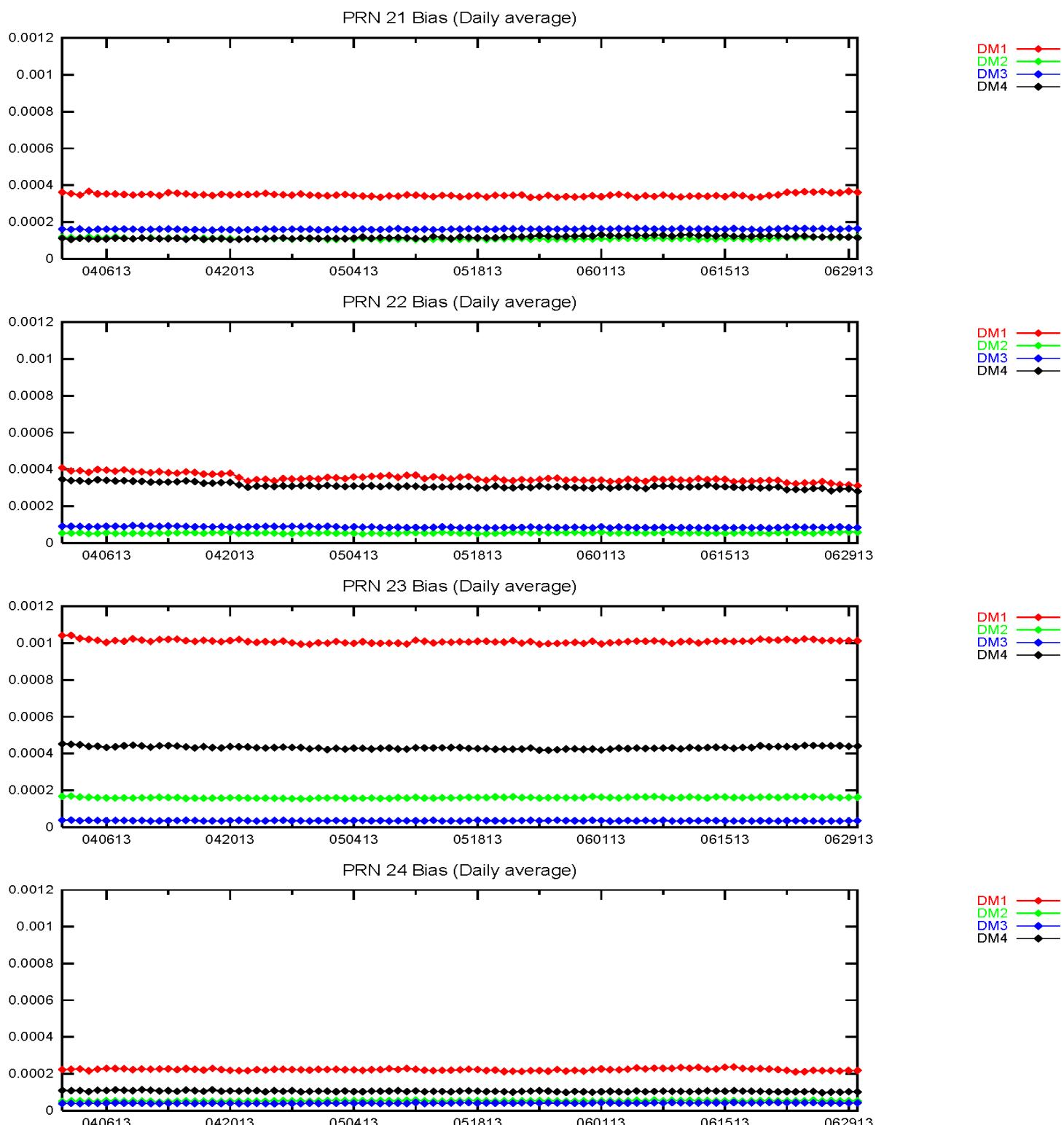
**Figure 11-3 PRN Bias Average Trend (PRN 1 – PRN 4)**

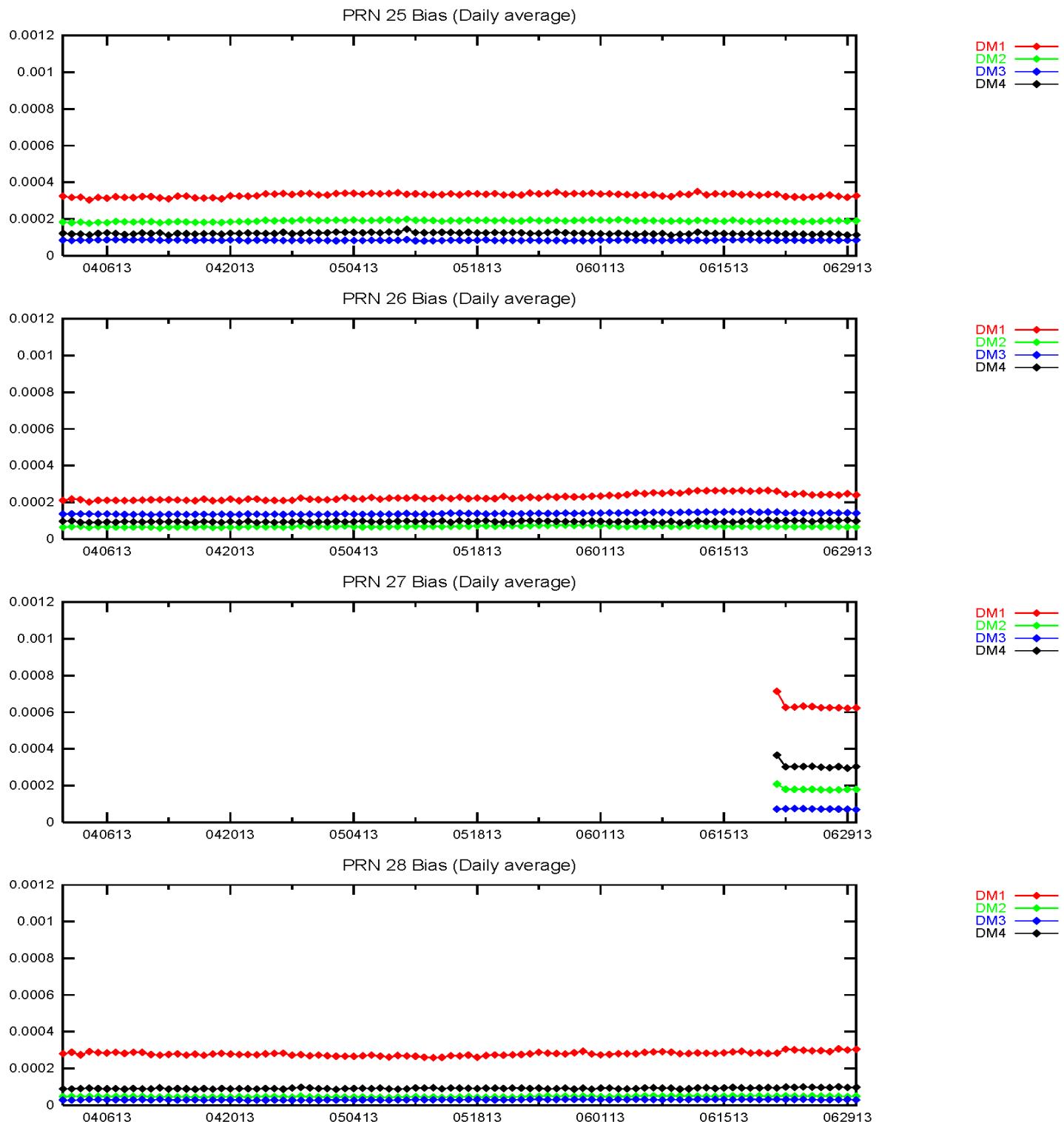
**Figure 11-4 PRN Bias Average Trend (PRN 5 – PRN 8)**

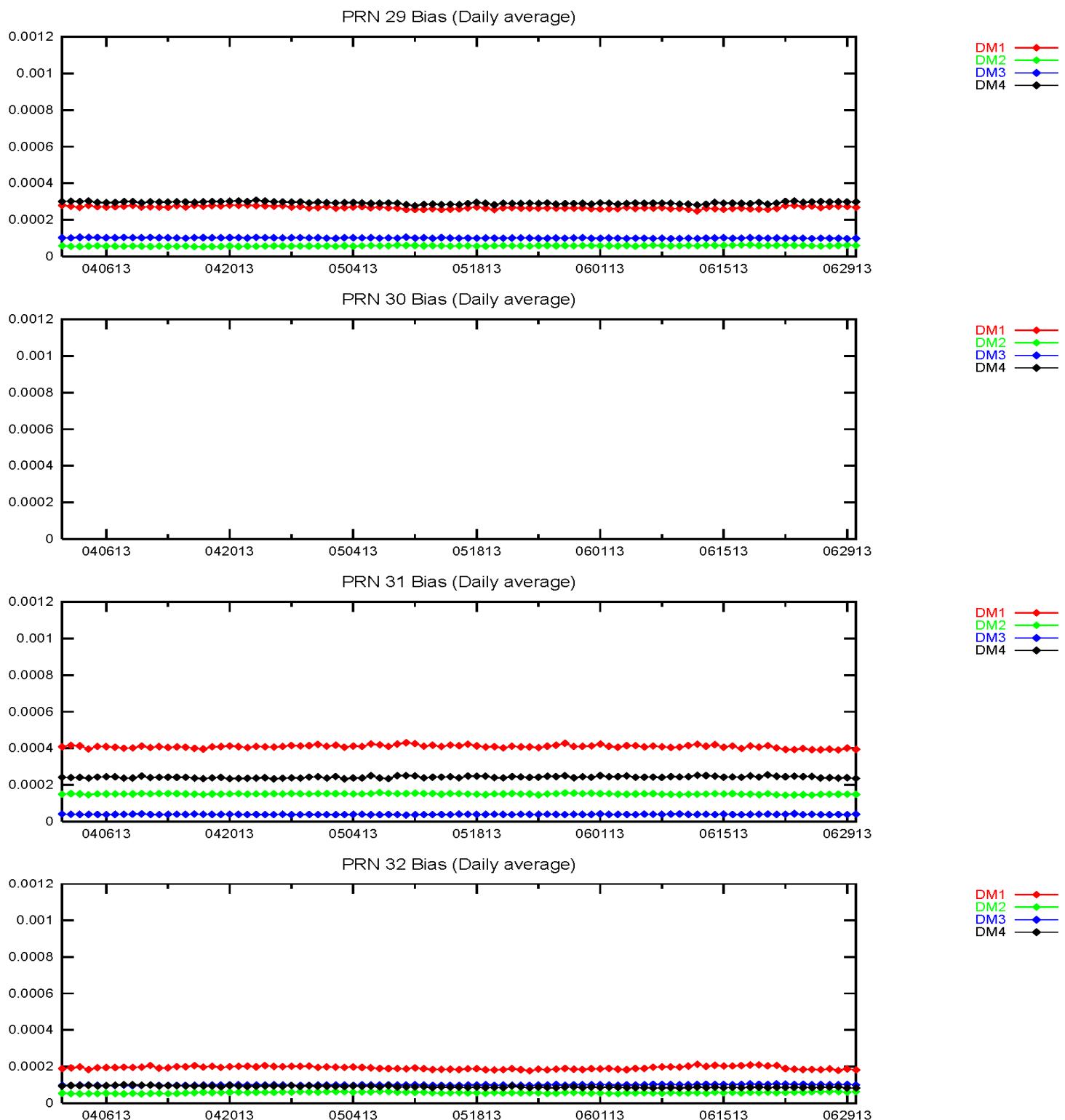
**Figure 11-5 PRN Bias Average Trend (PRN 9 – PRN 12)**

**Figure 11-6 PRN Bias Average Trend (PRN 13 – PRN 16)**

**Figure 11-7 PRN Bias Average Trend (PRN 17 – PRN 20)**

**Figure 11-8 PRN Bias Average Trend (PRN 21 – PRN 24)**

**Figure 11-9 PRN Bias Average Trend (PRN 25 – PRN 28)**

**Figure 11-10 PRN Bias Average Trend (PRN 29 – PRN 32)**

#### **11.4 SQM Trips**

SQM trip occurs when the estimated deformation exceeds threshold. There were no SQM trips for this quarter.

## Appendix A: Glossary

### General Terms and Definitions

**Alert.** An alert is an indication provided by the GPS/WAAS equipment to inform the user when the positioning performance achieved by the equipment does not meet the integrity requirements.

**Availability.** The availability of a navigation system is the ability of the system to provide the required function and performance at the initiation of the intended operation. Availability is an indication of the ability of the system to provide usable service within the specified coverage area.

**C&V.** The Correction and Verification Subsystem.

**CONUS.** Continental United States.

**Continuity.** The continuity of a system is the ability of the total system (comprising all elements necessary to maintain aircraft position within the defined airspace) to perform its function without interruption during the intended operation. More specifically, continuity is the probability that the specified system performance will be maintained for the duration of a phase of operation, presuming that the system was available at the beginning of that phase of operation.

**Coverage.** The coverage provided by a radio navigation system is that surface area or space volume in which the signals are adequate to permit the user to determine position to a specified level of accuracy. Coverage is influenced by system geometry, signal power levels, receiver sensitivity, atmospheric noise conditions, and other factors that affect signal availability.

**Dilution of Precision (DOP).** The magnifying effect on GPS position error induced by mapping GPS ranging errors into position through the position solution. The DOP may be represented in any user local coordinate desired. Examples are HDOP for local horizontal, VDOP for local vertical, PDOP for all three coordinates, and TDOP for time.

**DR.** Discrepancy Report

**Fault Detection and Exclusion (FDE).** Fault detection and exclusion is a receiver processing scheme that autonomously provides integrity monitoring for the position solution, using redundant range measurements. The FDE consists of two distinct parts: fault detection and fault exclusion. The fault detection part detects the presence of an unacceptably large position error for a given mode of flight. Upon the detection, fault exclusion follows and excludes the source of the unacceptably large position error, thereby allowing navigation to return to normal performance without an interruption in service.

**GEO.** Geostationary Satellite.

**Global Positioning System (GPS).** A space-based positioning, velocity, and time system composed of space, control, and user segments. The space segment, when fully operational, will be composed of 24 satellites in six orbital planes. The control segment consists of five monitor stations, three ground antennas, and a master control station. The user segment consists of antennas and receiver-processors that provide positioning, velocity, and precise timing to the user.

**Grid Ionospheric Vertical Error (GIVE).** GIVEs indicate the accuracy of ionospheric vertical delay correction at a geographically defined ionospheric grid point (IGP). WAAS transmits one GIVE for each IGP in the mask.

**Hazardous Misleading Information (HMI).** Hazardous misleading information is any position data, that is output, that has an error larger than the current protection level (HPL/VPL), without any indication of the error (e.g., alert message sequence).

**Horizontal Alert Limit (HAL).** The Horizontal Alert Limit (HAL) is the radius of a circle in the horizontal plane (the local plane tangent to the WGS-84 ellipsoid), with its center being at the true position, which describes the region that is

required to contain the indicated horizontal position with a probability of  $1-10^{-7}$  per flight hour, for a particular navigation mode, assuming the probability of a GPS satellite integrity failure being included in the position solution is less than or equal to  $10^{-4}$  per hour.

**Horizontal Protection Level (HPL).** The Horizontal Protection Level is the radius of a circle in the horizontal plane (the plane tangent to the WGS-84 ellipsoid), with its center being at the true position, which describes the region that is assured to contain the indicated horizontal position. It is based upon the error estimates provided by WAAS.

**IGS.** International GPS Service.

**Ionospheric Grid Point (IGP).** IGP is a geographically defined point for which the WAAS provides the vertical ionospheric delay.

**LNAV.** Lateral Navigation.

**LP.** Localizer Performance. LP is a WAAS operational service level with a HAL equal to 40 meters.

**LPV.** Localizer Performance with Vertical Guidance. LPV is a WAAS operational service level with a HAL equal to 40 meters and a VAL equal to 50 meters.

**LPV 200.** Localizer Performance with Vertical Guidance to 200 ft decision height. LPV 200 is a WAAS operational service level with a HAL equal to 40 meters and a VAL equal to 35 meters.

**MOPS.** Minimum Operational Performance Standards.

**NANU.** Notice Advisory to Navstar Users. NANU is an advisory message to inform users of a change in the GPS constellation. These messages inform users in advance of planned maintenance and also notify users of unscheduled outages.

**Navigation Message.** Message structure designed to carry navigation data.

**Non-Precision Approach (NPA) Navigation Mode.** The Non-Precision Approach navigation mode refers to the navigation solution operating with a minimum of four satellites with fast and long term WAAS corrections (no WAAS ionospheric corrections) available.

**Position Solution.** The use of ranging signal measurements and navigation data from at least four satellites to solve for three position coordinates and a time offset.

**Precision Approach (PA) Navigation Mode.** The Precision Approach navigation mode refers to the navigation solution operating with a minimum of four satellites with all WAAS corrections (fast, long term, and ionospheric) available.

**RFI.** Radio Frequency Interference.

**Selective Availability.** Protection technique employed by the DOD to deny full system accuracy to unauthorized users.

**Signal Quality Monitor (SQM).** SQM monitors correlator measurements to detect signal deformations that originate in the GPS or GEO satellites and ensures that the UDREs are sufficiently inflated to protect given the monitor's current observations.

**Standard Positioning Service (SPS).** Three-dimensional position and time determination capability provided to a user equipped with a minimum capability GPS SPS receiver in accordance with GPS national policy and the performance specifications.

**SV.** Space Vehicle.

**User Differential Range Error (UDRE).** UDRE's indicate the accuracy of combined fast and slow error corrections. WAAS transmits one UDRE for each satellite in the mask.

**Vertical Alert Limit (VAL).** The Vertical Alert Limit is half the length of a segment on the vertical axis (perpendicular to the horizontal plane of WGS-84 ellipsoid), with its center being at the true position, which describes the region that is required to contain the indicated vertical position with a probability of  $1-10^{-7}$  per flight hour, for a particular navigation mode, assuming the probability of a GPS satellite integrity failure being included in the position solution is less than or equal to  $10^{-4}$  per hour.

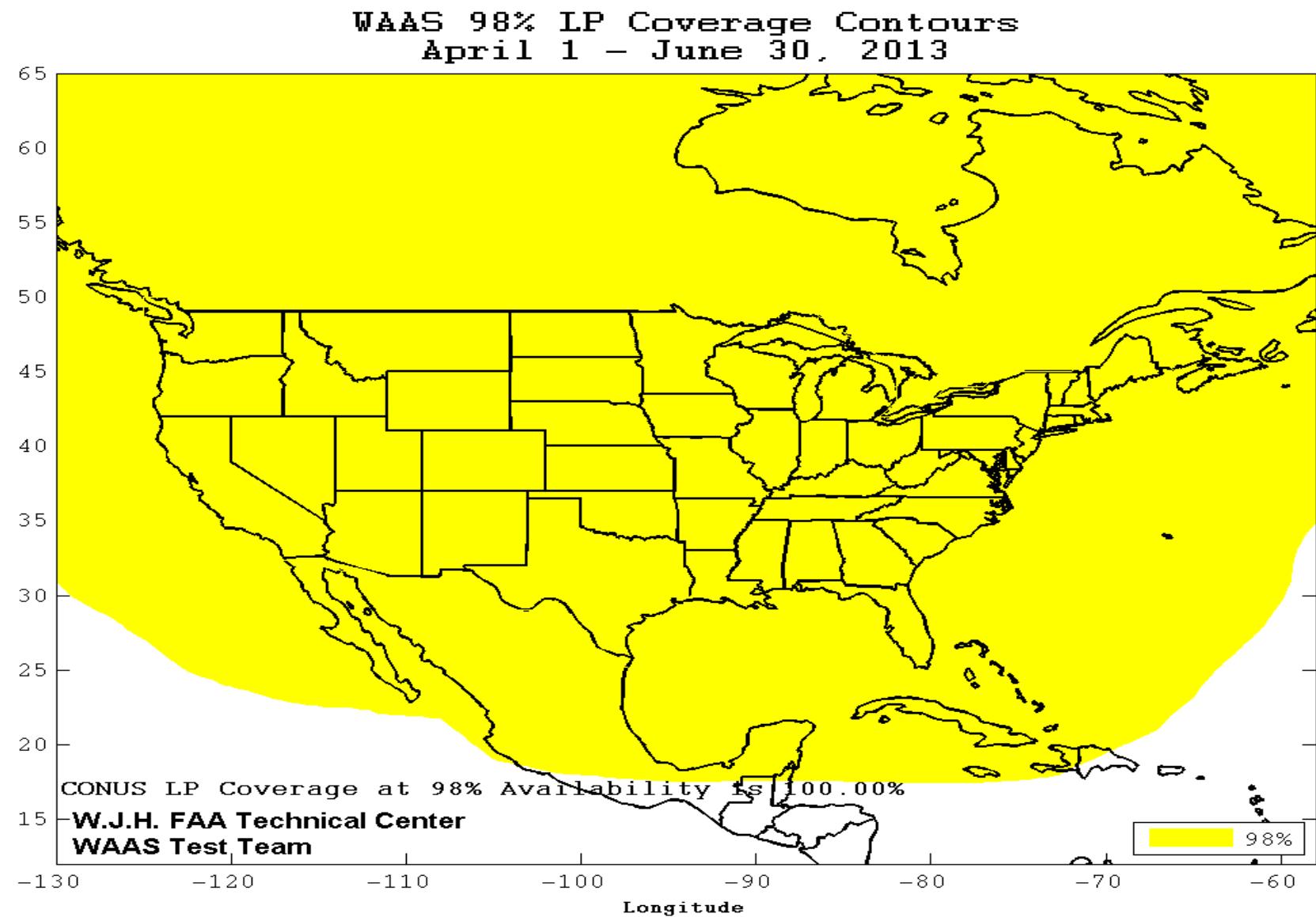
**Vertical Protection Level (VPL).** The Vertical Protection Level is half the length of a segment on the vertical axis (perpendicular to the horizontal plane of WGS-84 ellipsoid), with its center being at the true position, which describes the region that is assured to contain the indicated vertical position. It is based upon the error estimates provided by WAAS.

#### VNAV. Vertical Navigation.

**Wide Area Augmentation System (WAAS).** The WAAS is made up of an integrity reference monitoring network, processing facilities, geostationary satellites, and control facilities. Wide area reference stations and integrity monitors are widely dispersed data collection sites that contain GPS/WAAS ranging receivers that monitor all signals from the GPS, as well as the WAAS geostationary satellites. The reference stations collect measurements from the GPS and WAAS satellites so that differential corrections, ionospheric delay information, GPS/WAAS accuracy, WAAS network time, GPS time, and UTC can be determined. The wide area reference station and integrity monitor data are forwarded to the central data processing sites. These sites process the data in order to determine differential corrections, ionospheric delay information, and GPS/WAAS accuracy, as well as verify residual error bounds for each monitored satellite. The central data processing sites also generate navigation messages for the geostationary satellites and WAAS messages. This information is modulated on the GPS-like signal and broadcast to the users from geostationary satellites.

**Appendix B: Additional Coverage Plots**

This section includes coverage plots with 99% LPV 200 availability contour, 98% LPV availability contours, and 98% LP availability contours for the quarter. Figure B.1 shows CONUS coverage with 98% LP availability contour. Figure B.2 shows Alaska coverage with 98% LP availability contour. Figure B.3 shows CONUS coverage with 98% LPV availability contour. Figure B.4 shows Alaska coverage with 98% LPV availability contour. Figure B.5 shows CONUS coverage with 99% LPV 200 availability contour. Figure B.6 shows Alaska coverage with 99% LPV 200 availability contour.

**Figure B-1 98% CONUS LP Availability Contour**

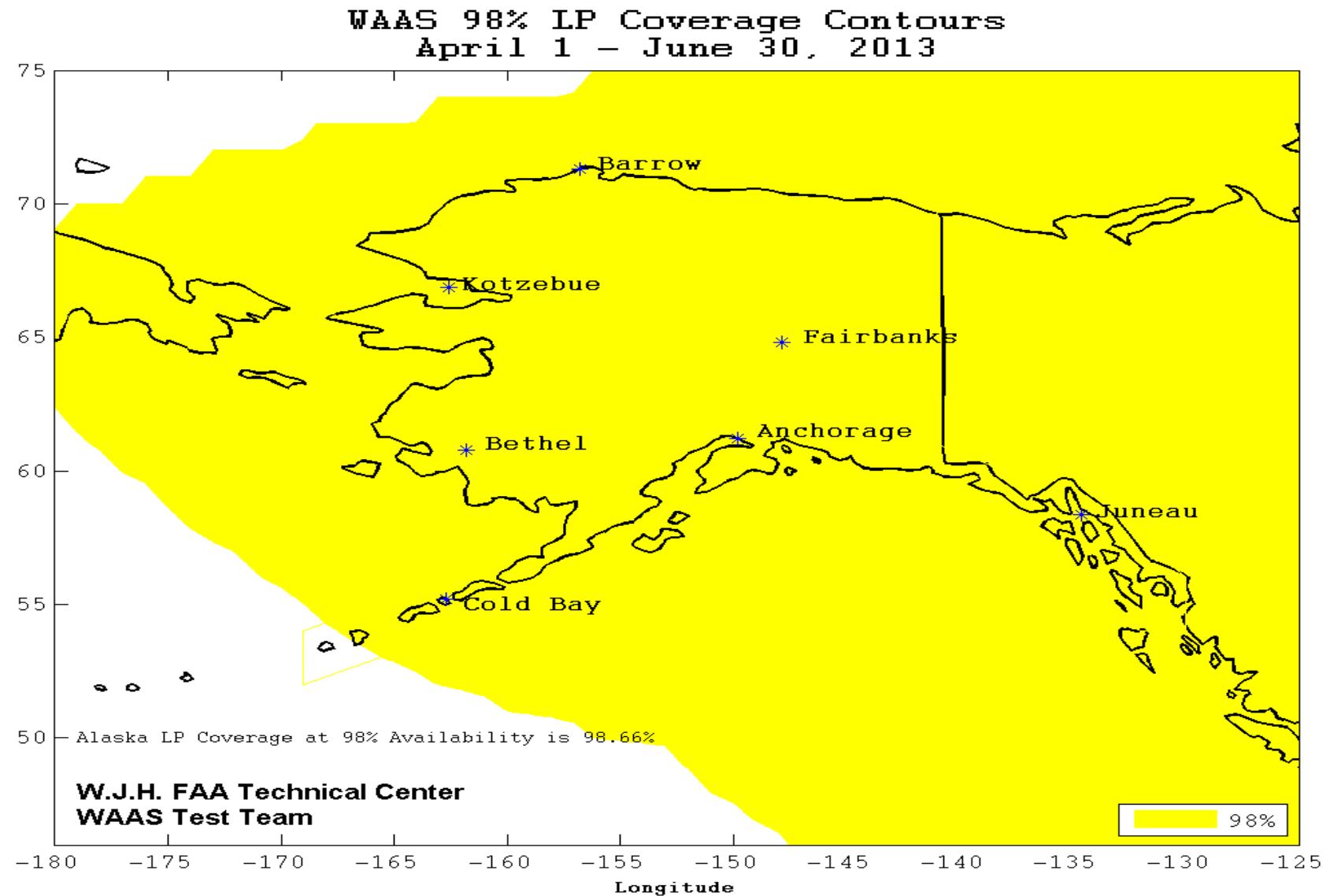
**Figure B-2 98% Alaska LP Availability Contour**

Figure B-3 98% CONUS LPV Availability Contour

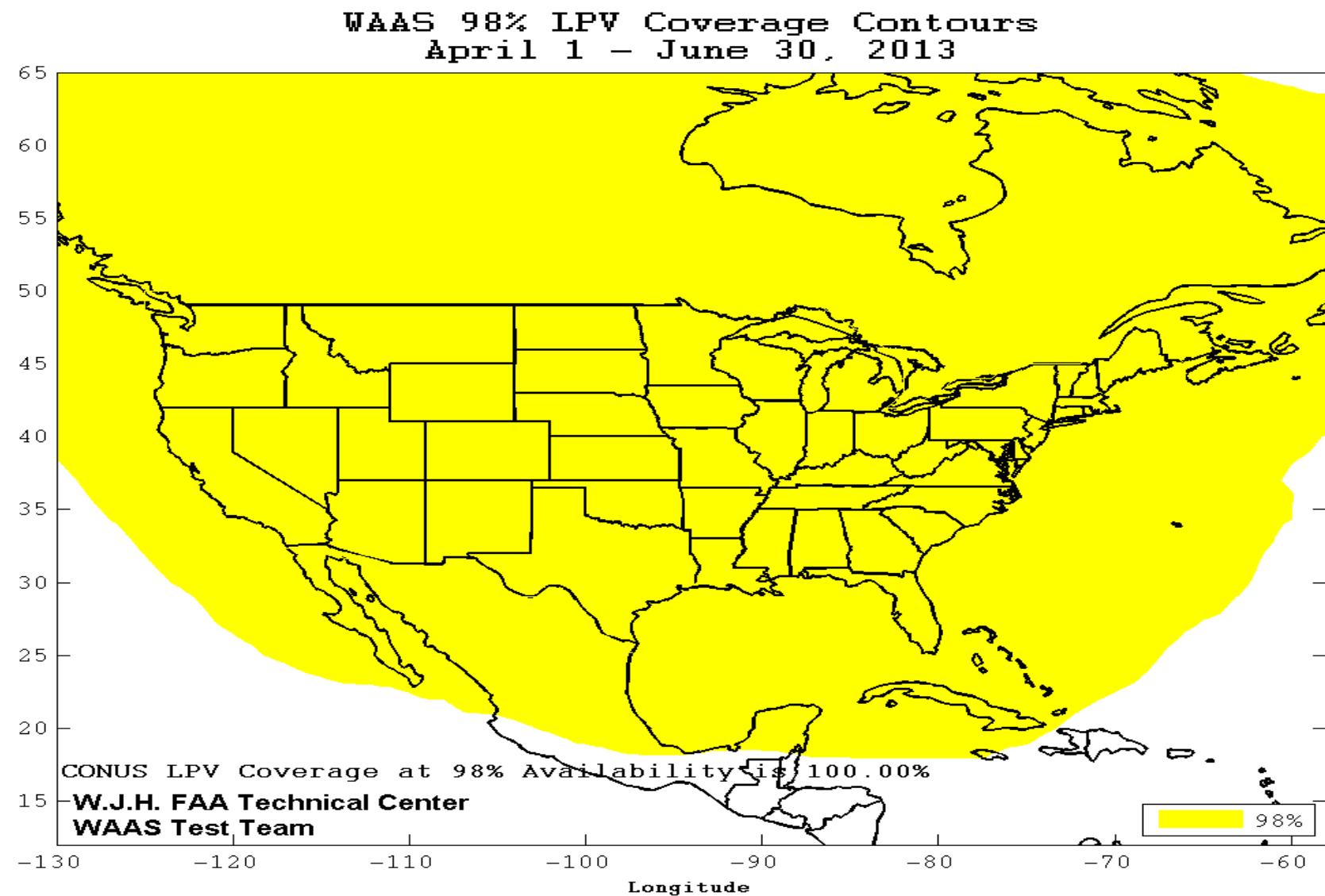


Figure B-4 98% Alaska LPV Availability Contour

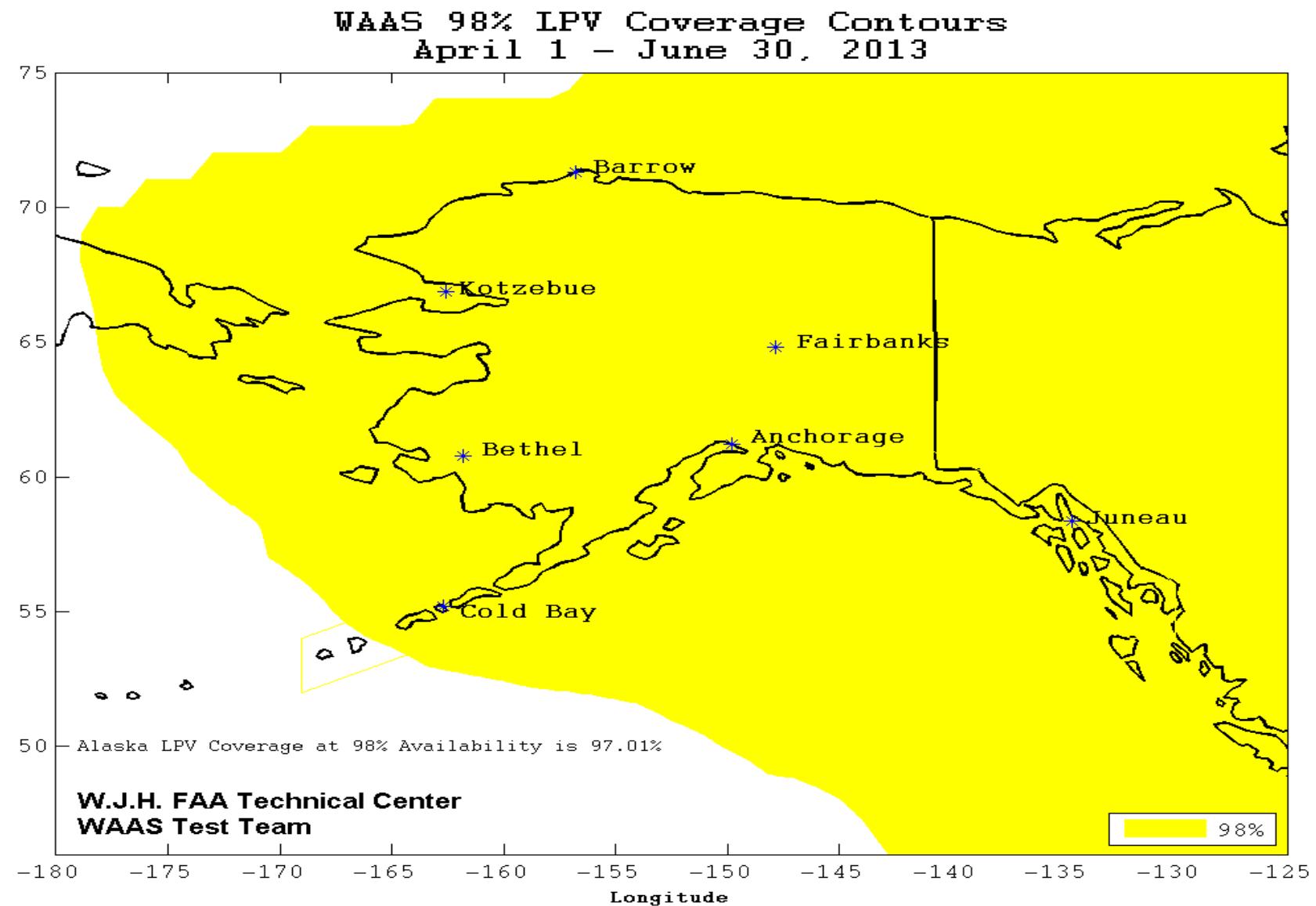
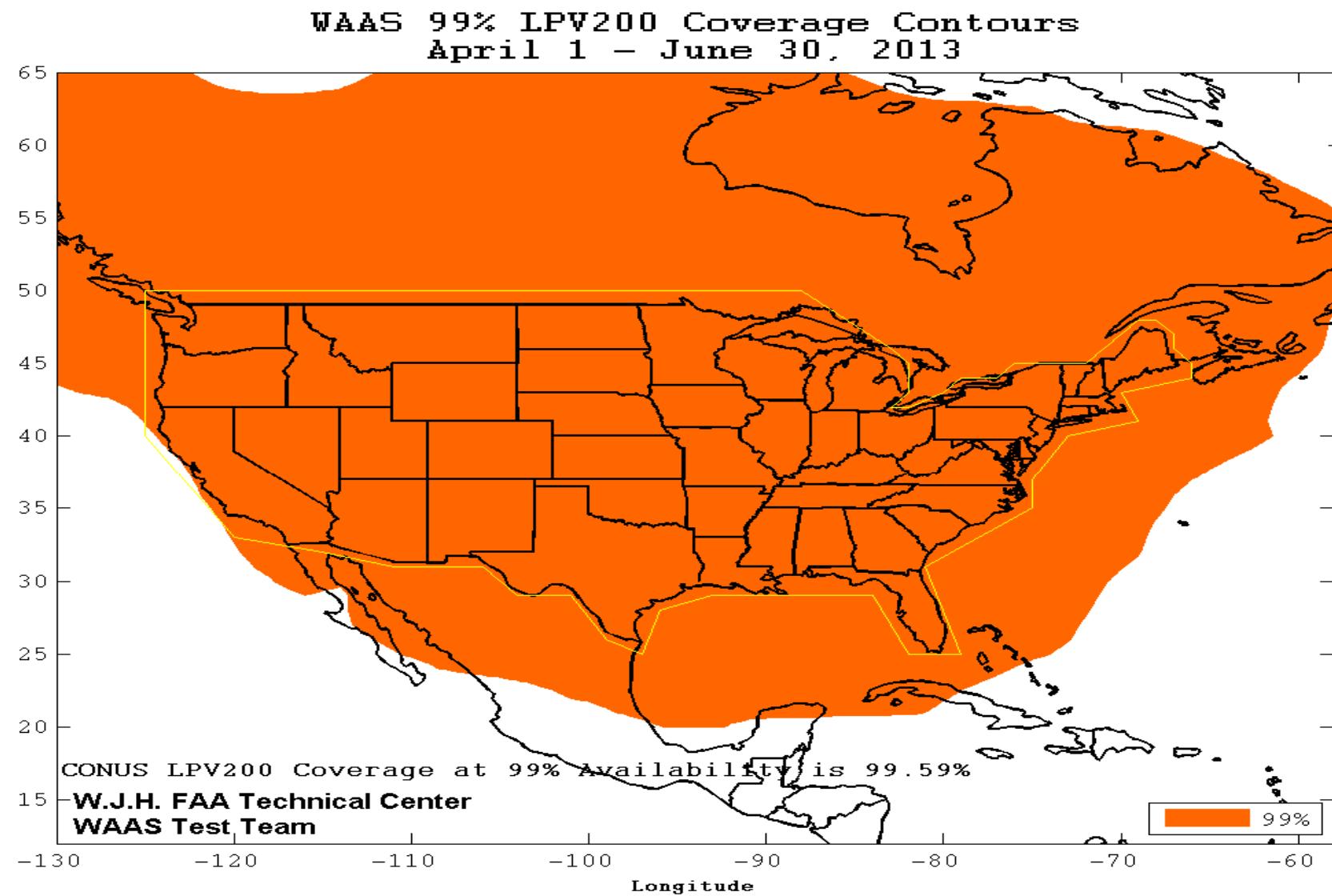


Figure B-5 99% CONUS LPV 200 Availability Contour



**Figure B-6 99% Alaska LPV 200 Availability Contour**